



**FIU**

Engineering  
& Computing

Mechanical and Materials Engineering

ANNUAL REPORT  
2017-18





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# ABOUT THE DEPARTMENT

The MME department has the mission of educating and training high quality future engineers as well as scientists in both mechanical engineering and materials engineering fields. The faculty of the department are also very active in their research covering a broad range of areas including solid mechanics, fluid and thermal sciences, robotics and manufacturing, design and novel processing of advanced materials for critical energy, electronics, aerospace, or biomedical applications, and multidisciplinary computational modeling & optimizations. Graduate students from the MME department have demonstrated high quality and productivity and found employment in various reputable institutions in academia, government, and private industries.

## MESSAGE FROM THE CHAIRMAN



DR. ARVIND AGARWAL

The Department of Mechanical and Materials Engineering (MME) at Florida International University (FIU) offers a curriculum which is designed to give the student a thorough understanding of the basic laws of science and advanced analysis and design skills to stimulate and develop creative thinking, a professional attitude, economic judgment and environmental consciousness. The aim is to develop the students' potential to the fullest, to prepare the students for superior performance as mechanical engineers, and to provide the students with the fundamental principles necessary for pursuing advanced study in the diverse fields of engineering, science and business. The MME's Masters' and PhD graduate programs cover a range of subdisciplines: fluid/thermal sciences and energy systems, materials design and processing, robotics and manufacturing, and multidisciplinary computational design & optimization. The goal of MME department is to improve the metrics: 4 year FTIC graduation rate, increase PhD production, increase research expenditure, and develop a preeminent research program.

# FACTS & ACHIEVEMENTS

## STUDENTS

4 year FTIC Graduation Rate has increased from 6% (2016-17) to 17% (2017-18)  
849 Students  
62 Graduate Students  
11 New PhD admitted in Fall 2018

## FACULTY SCHOLARSHIP

68 Journal articles  
31 Conference articles  
35 Journal editorial boards  
7 Fellows of the Professional Societies

## PhD PRODUCED

8 PhD Produced in 2017 - 2018  
6 Materials Engineering  
2 Mechanical Engineering

## PATENTS & DISCLOSURES

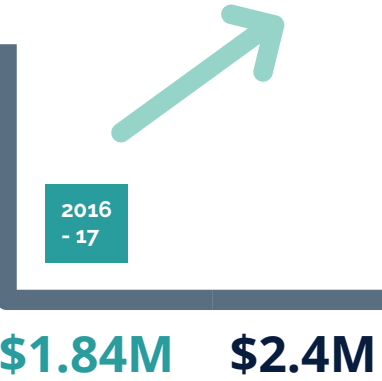
5 Patents

## NEW FACULTY HIRED

3

## GRANTS

21 active grants



# PUMA MENTORING PROGRAM

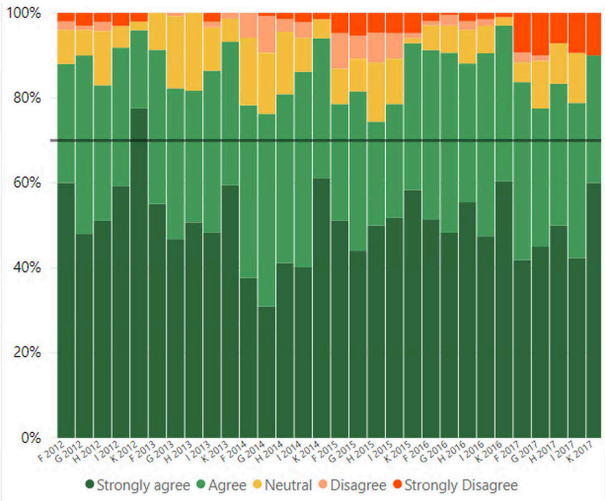
The faculty members have broad experience across engineering disciplines and fields, and we would like to offer that experience to our students in the form of a new mentorship program named **PUMA: Placing Undergraduates in Mentored Activities** (for those wondering, puma is also the genus of our mascot, the panther).

The aim of PUMA is to actively identify undergraduate students entering their junior year and match them up with a faculty mentor that can help provide additional resources to assist in navigating the last two years of engineering student life including career planning, industry and academic internships, available scholarships, or any additional questions that you might have.



# ABET ONLINE DATA COLLECTION

In order to keep improving the program and make sure our students receive the best formation, the department has been implementing a new way of collecting data on a real time basis. The new system aids in viewing and understanding big data from our students and courses outcomes, with all this information, we are able to improve the program where it needs to, when it needs to. It also improves the way ABET and our faculty will be able to access this information, helping everyone to improve the department.



## Engineering Accreditation Commission

### Courses outcomes:

- |   |  |
|---|--|
| (a) Ability to apply knowledge of mathematics including multivariable calculus and differential equations, science including physics, and engineering | (f) an understanding of professional and ethical responsibility  |
| (b) an ability to design and conduct experiments, as well as to analyze and interpret data  | (g) an ability to communicate effectively  |
| (c) an ability to design a system, component, or process to meet desired needs under realistic constraints  | (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context |
| (d) an ability to function on multidisciplinary teams   | (i) a recognition of the need for, and an ability to engage in life-long learning                                    |
| (e) an ability to identify, formulate, and solve engineering problems   | (j) a knowledge of contemporary issues   |
|   | (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.       |

# TEACHING LABS UPGRADE

Several tools were upgraded and purchased for mechanical and materials engineering labs. These are the following:

## THERMOFLUIDS LAB

- 2 Armfield HT10XC Computer Controlled Heat Transfer Unit
- HT17 Unsteady State Heat Transfer
- HT14 Combined Convection and Radiation
- Armfield C15-12 Electronic Manometer Bank

- 16 Differential Pressure Sensors
- 0-178 mm H<sub>2</sub>O
- Works with both Wind Tunnels

- Turbine Technologies FLUIDMechatronix

- Process Automation and Pumps teaching system: Plant Automation, Pump Curves, Cavitation, Impeller profiles.



## MECHANICS OF MATERIALS LAB

- Pasco Materials Testing System
  - Tensile, Compression, Shear, Photoelasticity.
- Leco LM-110AT Vickers Micro-indentation Teste
- MTS C45 and C41 Tensile Tester
- United Tensile Tester Calibration and Repair
- Haas ST-15Y CNC Lathe

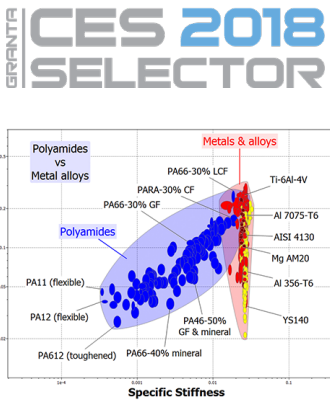


## MANUFACTURING PROCESSES LAB

- 3D Systems ProJet MJP 5600

## SOFTWARE

CES Selector combines a unique range of materials data with specialist tools to help you solve real materials problems. It has been improved and optimized for more than twenty years to deal with the subtleties of material selection. The 2018 version continues this tradition. It makes specific data and tool enhancements that help solve tricky materials problems, like how to filter materials based on combinations of materials properties, or how to factor-in weldability. This materials selector software is a great tool for Senior Design Projects.





## ONLINE COURSES OFFERING

Over the 2017-2018 school year, the MME department started to prepare for many online courses to be offered for the first time in the 2018-2019 school year.

For 2018 fall, the following four courses will be offered online:

- 1. EML3126 Transport Phenomena (Dr. Seyad Ebrahim Beladi)
- 2. EGN3321 Dynamics (Dr. Carman Carmen Muller-Karger)
- 3. EMA3702 Mechanics & Materials Science (Dr. Zhe Cheng)
- 4. EML4416 Solar Energy Technology: Fundamentals and Applications (Dr. Charlie Lin)

For 2019 spring, the following courses have tentatively been planned as online

- 1. EGN3311 Statics (Dr. Jiuhoa Chen)
- 2. EGN3343 Thermodynamics I (Dr. Bilal El-Zahab)
- 3. EGN3365 Materials Engineering (Dr. Arvind Agarwal)
- 4. EML4140 Heat Transfer (Dr. Seyad Ebrahim Beladi)
- 5. EMA5295 Principles of Composite Materials (Dr. Benjamin Boesl)

Other faculty members have already expressed interests or are considering the possibilities of offering more online courses, such as Dr. Yiding Cao for EML4601 Principles of Refrigerating and Air Conditioning (possibly 2020 spring) Dr. Norman Munroe for EMA5326 Corrosion (possibly 2020 fall)

## PhD STUDENT RECRUITMENT

Over the 2017-2018 academic year, the MME department came up with a concrete plan aimed at significantly enhancing the Ph.D. recruitment efforts and improving the quality as well as numbers of Ph.D. applicants. In particular, the plan includes the following activities:

- 1. Advertisement in professional journals for MSE and ME PhD programs for FIU MME department
- 2. Printing and direct mailing of recruitment flyers to US 4-year college and international universities
- 3. Purchase of ETS mailing lists for applicants interested in pursuing PhD programs in ME and MSE in the southeast of US
- 4. Attending local recruitment event to promote our PhD programs to local college/university engineering graduates
- 5. Travel for highly qualified admitted domestic PhD students to visit FIU MME department
- 6. Attendance/Advertisement at professional conferences

The department has been awarded with funds from University Graduate School (UGS) and will carry out the recruitment plan in the coming 2018-2019 school year and expects to see more applicants with better qualifications.

## UNDERGRADUATE RESEARCH HIGHLIGHTS

### BRIANA CANET & NICOLE BACA (SOPHOMORES): CELL-MET

Numerous FIU students, as part of the Cellular Metamaterials (CELL-MET) mega-project, funded by National Science Foundation, Engineering Research Center, were chosen for Research Experience and Mentoring (REM) Program. Students of all engineering fields worked in an assigned lab either in Florida International University or Boston University throughout the summer in order to accomplish CELL-MET's ultimate goal: to synthesize personalized heart tissue that could be utilized in the short-term to test the efficacy of drugs and later to replace damaged or diseased muscle after a heart attack by integrating breakthroughs in manufacturing and nanotechnology with regenerative medicine and tissue engineering. After their 10-week journey in the program, students presented their summer research at Boston University's Photonics Center.



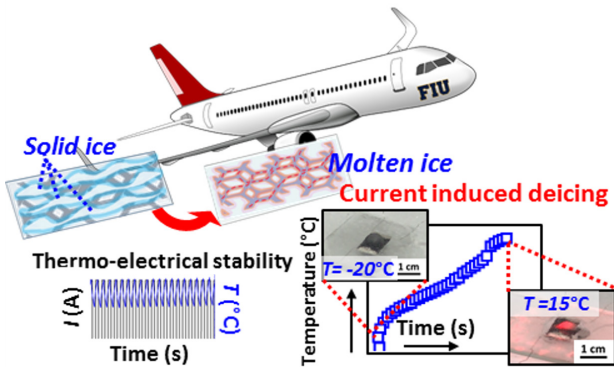
### KUMAR YOGESH SHAH (SENIOR): NASA'S SWARMATHON

This year our very own FIU Mechanical Undergraduate students had the opportunity to participate in the 2018 3rd Annual NASA Swarmathon Competition. This competition is hosted by NASA & The University of New Mexico's Moses Biological Computation Lab at The Kennedy Space Center in Florida. The goal of this competition is for each team to use three rovers sent by NASA to design, test, and optimize an algorithm, through code, in order to efficiently locate, identify, and collect resources; replicating a rover exploring Mars' surface. Even though they started half way through the season, they managed to qualify and place 6th out of 22 teams.



### JENNIFFER BUSTILLO (SENIOR): GRAPHENE FOAM BASED DEICING COMPONENT

As an undergraduate research student working in Plasma Forming Lab at FIU, Jenniffer's research included the use of Boron Nitride Nanoparticles to develop a new generation of rapid prototyping scaffolds via stereolithography, development of tribologically enhanced graphene based materials used in 3D printing, and the synthesis of a novel graphene foam heater. Jenniffer's most recent innovation involved the synthesis, development and prototyping of a highly efficient deicing (477% efficient) graphene foam based polymer composite. Light-weight, high thermal and electrically stable Graphene foam polymer composites can replace current coatings, mechanical ice removal efforts and most importantly highly toxic chemical sprays in aircraft structures. Jenniffer work has been files as an U.S. patent.





## STUDENTS ACHIEVEMENTS

### UNDERGRADUATE

09/26/2017

Olubunmi Popoola interned at Tesla Motors with Battery Safety and R&D team, Tesla Motors Palo Alto, California. Tesla pioneering the next generation electric vehicles, battery safety is predominant as it is the main source of energy. Our undergraduate student was fortunate enough to be the part of electric vehicle revolution and take a glimpse into the future transportation systems.



12/06/2017

Daniela Gil, interned at Lockheed Martin Rotary and Mission Systems (RMS) where she was involved in testing and integration for the program's flight simulator. Daniela was tasked with working on the United Kingdom Military Flight Training Systems (UKMFTS) program, which provides elementary to advanced flight training for the aircrew of the British Armed Forces.



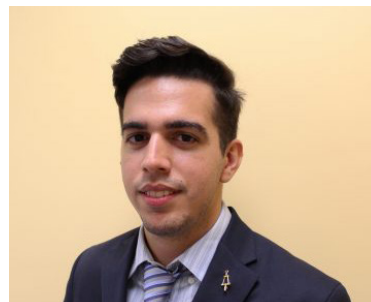
12/09/17

Daniella Bernal, World Ahead Graduate, entered FIU at the age of 16 with an FIU Presidential Scholarship and dreamed of working for SpaceX CEO Elon Musk. As a founding member of FIU's Aerospace Engineering Club, Bernal kept her goal top-of-mind and has already moved to California after accepting a job at SpaceX.



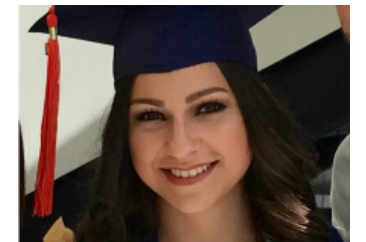
01/08/18

Manuel Alejandro Santos interned at Siemens with the team that modeled, designed and tested new heating systems to prevent ice formation on turbine blades. The primary goal of the design was to reduce energy losses caused by changes in aerodynamic forces due to ice formation.



12/19/17

Grecia Rodriguez Dominguez received the outstanding Bachelor's Degree Graduate Award at the Induction into the Order of Engineers



02/02/18

Gabriela Gutierrez Duran was awarded a scholarship from the Zonta Women's Club. This is the second year in a row that the club awards a scholarship to one of our students. As this year's winner, Gabriela is now eligible for the National Amelia Earhart Scholarship.



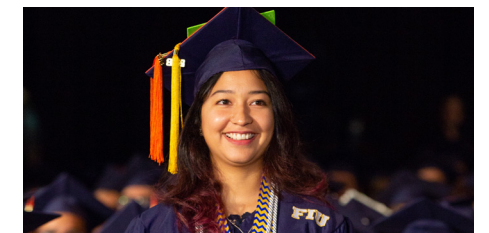
03/28/18

Melania Antillon, Jenniffer Bustillos, Daniela Gil, and Jose Ortega represented the FIU College of Engineering and Computing at the 2018 Florida-Wide Student Engineering Design Invitational with their project "In-situ Mass Sensor for Materials Used in Next Generation Space Vehicles" during their senior year.



04/19/18

Jennifer Bustillos, World Ahead Graduate, graduated with five first-authored journal articles under her belt and continues her education at FIU as a graduate student, under Prof. Agarwal's supervision to pursue Master's degree in Materials Science and Engineering. She works on a Navy-funded project.



04/27/18

Our FIU MME students competed in the quarter finals at the NASA Swarmathon 2018 competition and received 6th place among 22 competing schools. The team also mentored and assisted Miami Coral Park Senior High School for their preparations. They received 1st place among high schools.



04/29/18

Tiffany Ascanio, World Ahead Graduate, along with her wonderful friend Kali, graduated with a bachelor's degree in Mechanical Engineering. Tiffany will head to Seattle along with Kali to work for Boeing Commercial Airplanes.





GRADUATE

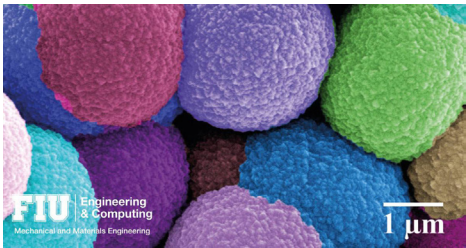
12/20/17

Mohammad Asadikiya, is a Worlds Ahead Graduate and has published several high-ranking peer-reviewed journals and he has presented his findings at several international conferences. Among his other accomplishments, he is the co- chair for career development in the NACE Southern Florida Section, where he mentor students interested in the materials science industry.



01/11/18

Richa Agrawal was selected as a runner-up in JEOL's 2018 SEM/TEM/EPMA Image Contest with her image "Micro Cotton Candy".



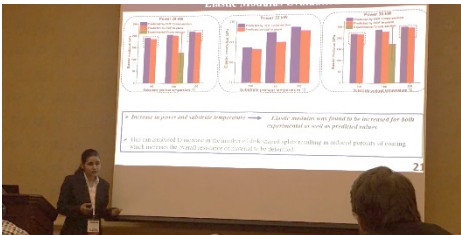
04/19/18

Pranjal Nautiyal and Melania Antillon represented Materials Advantage at dinner with President Rosenberg to discuss student leadership.



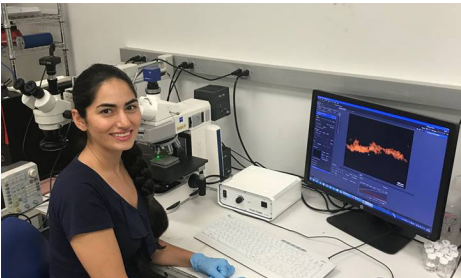
05/18/18

Sadhana Bhusal received a prestigious Graduate Student Scholarship from International Thermal Spray Association, which is awarded to only two students every year worldwide. With that scholarship she worked on computational approach for designing plasma sprayed coatings from splat to bulk and presented her work in International Thermal Spray Association conference.



05/21/18

Elnaz Mirtaheri received the 2018 FIU Biomedical Research Initiative (BRI) Summer Research Award. The BRI award is designed to fund students in the biomedical sciences through a program development award from the NIH-National Institute of General Medical Sciences (NIGMS RISE Program). Elnaz is currently working on the acoustofluidic separation of vesicles based on proteomic and lipidomic signatures under the supervision of Dr. El-Zahab. The objective of the proposed research is to develop a reliable label-free method for the separation of extracellular vesicles for cancer bioanalysis.



CLUBS

08/09/17

FIU Provost and Executive Vice President Kenneth G. Furton suited up and took a race car for a test drive around the Engineering Center! It was a Formula SAE race car built entirely from scratch by engineering students who are part of the FIU chapter of the Society of Automotive Engineers (SAE), also known as Panther Motorsports, whose President is Ignacio Hernandez.



08/17/17

Students from the FIU chapter of the Society of Automotive Engineers tested their automotive skills by racing in their self-engineered cars. Ignacio Hernandez, a junior mechanical engineering major at FIU, coordinated the entire competition.



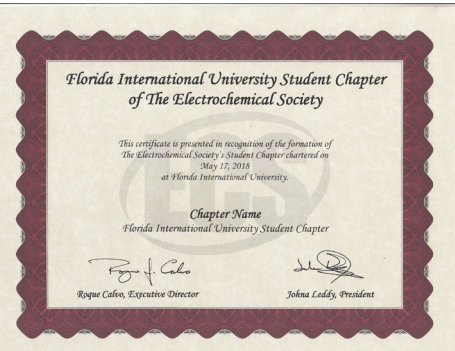
05/16/18

The FIU SAE team was placed NUMBER 1 in Florida and 47th internationally in the FSAE Michigan Competition held in Brooklyn, MI, on early May 2018. Over 100 universities from all over the world came to show their greatness. FIU did an amazing job in showing their design and engineering skills.



06/21/18

The ECS Board of Directors approved the Electrochemical Society Chapter at FIU, for \$1000 per year. ECS student chapter will offer student members vital opportunities to enhance their professional development and academic experience through promoting electrochemical and solid-state science and technology. Please join us in congratulating Professor Chunlei Wang and Amin Rabiei, ECS adviser and President respectively.





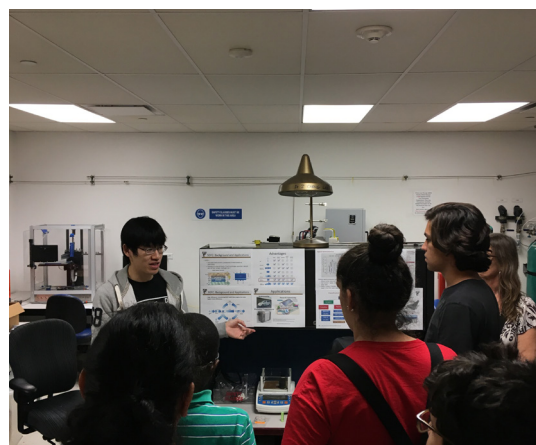
## OUTREACH & COMMUNITY

### ENGINEERING EXPO

The FIU Engineering Expo is the college's premier community outreach event organized annually and welcoming more than 1,400 K-12 students from Miami Dade and Broward County Schools (elementary, middle and high schools) to the FIU Engineering Center to engage FIU students, researchers and staff, and to discover the endless possibilities of STEM.

MME undergraduates and graduate researchers hold pride in disseminating the STEM knowledge to K-12 students with the intention of attracting more students to take part in STEM programs offered at FIU. All of the college's research and learning labs are opened for tours, there are contests, presentations and hands-on projects making the Expo an unforgettable experience. The event provides exposure to science and engineering for local public school students to encourage them to consider a career in the engineering and science professions, where minorities are under-represented. The Expo enhances the professional and inter-personal development skills of participants. It also provides an opportunity for students and faculty of the college to work together as a cohesive team to benefit the community.

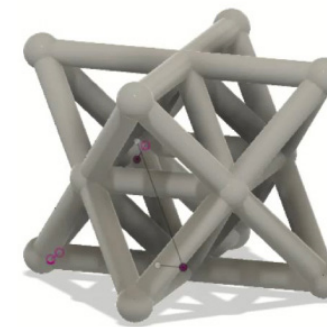
On the day of the event, over 1400 students from Miami-Dade and Broward County Schools (elementary, middle and high schools) come to the FIU Engineering Center for an interactive, multifaceted program lasting five hours. The event starts with opening ceremonies that include a color honor guard, stirring call to action by the Dean of the FIU College of Engineering and Computing and an inspiring speech by a special guest speaker.



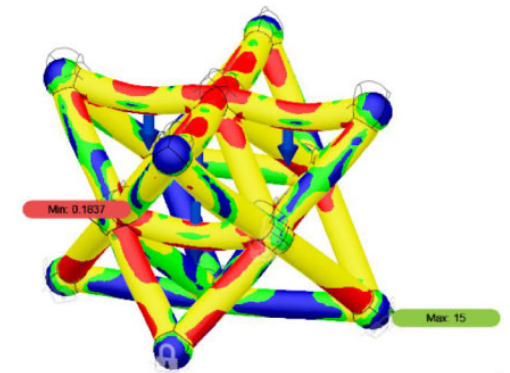
## HIGH SCHOOL MENTORING

### CAD MODELLING OF COMPLEX LATTICE FOR 3D SCAFFOLD AND FEA ANALYSIS

Marving Figueroa from Terra Environmental Research Institute high school was the part of High School Mentoring program held at FIU during summer of 2018. Marving took keen interest in designing 3D micro lattices for efficient micro scaffold design which would form platform for tissue culturing. He also performed basic static structural finite element analysis on the complex micro lattices to optimize the design parameters. Marvin plans to join FIU ME as an undergraduate student for Fall 2019.



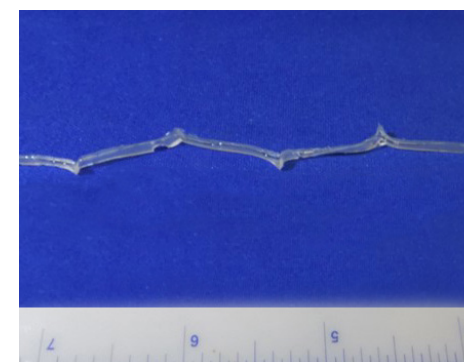
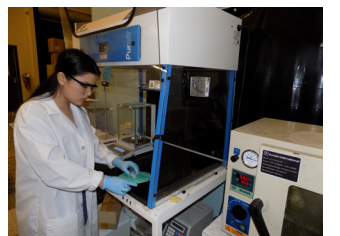
Truss Microlattice



Truss Microlattice: static structural finite element analysis

### DEVELOPING COMPLEX SELF-ASSEMBLY PATTERNS USING SHAPE MEMORY POLYMER VIA ORIGAMI TECHNIQUE

Connie Ly from John A. Ferguson Senior High School took part in High School Apprenticeship Program (HSAP) sponsored by Army Research Office. She worked on developing complex actuation designs for aerospace application using Shape Memory Polymer. As part of the program Connie received extensive training in polymer materials processing, developing complex folding patterns in shape memory polymers and safe lab practices.



Low surface area accordion type shape memory actuator



High surface area accordion type shape memory actuator



# FACULTY ACHIEVEMENTS

## TOP SCHOLAR AWARD: DR. BENJAMIN BOESL

FIU recognizes that academic excellence is driven by dedicated faculty who instruct, research, create, mentor and serve. Each year, select individuals are recognized with an award for significant achievements in their scholarly pursuits. Dr. Boesl was selected as one of the Top Scholar in 2017 for his contributions to the development of FIU MME department through winning various research proposals.



## IMEC 2017 TRACK PLENARY SPEAKER: DR. GEORGE S. DULIKRAVICH

Dr. Dulikravich received an award following his plenary lecture (co-authored with Colaco, M.J., Dennis, B.H., Reddy, S.R.) on "Materials Processing Control Using Electric and Magnetic Fields" at the ASME IMECE2017 in Tampa, FL. He formulated variety of mathematical models governing fluid flow and possible solidification processes under the influence of pressure, temperature, electric and magnetic fields. His work illustrated a few applications of such combined fields when they are optimized in order to achieve certain desired features of the flow-field and the solid accrued during solidification.



## FACULTY TEACHING AWARD: DR. BILAL EL-ZAHAB

Dr. El-Zahab received "Excellence in Teaching Award" from the Faculty Council, CEC. The College of Engineering and Computing awards its Faculty in the areas of teaching, research, service and mentorship. Excellence in teaching is demonstrated in the manner teachers direct, deliver, control, and react to the people, situations, and acquisition of knowledge within the confines of an actual or virtual classroom.



## ABET AWARD: DR. CESAR LEVY

Dr. Cesar Levy has been recognized as an outstanding ABET Expert by the ABET Board of Directors. As one of their program evaluators, Dr. Levy aids in reviewing over 3,800 programs at more than 700 institutions around the world. Dr. Levy also serves as the Chair of the MME ABET Committee. ABET is a forward-thinking, purpose-driven organization recognized by the Council for Higher Education Accreditation. All over the world, ABET accredits college and university technical programs committed to the quality of the education they provide their students.



## DURIP AWARD: DR. PEZHMAN MARDANPOUR

The Defense University Research Instrumentation Program (DURIP) supports university research infrastructure essential to high-quality Defense relevant research and the research instrumentation that is necessary to carry out cutting-edge research. Dr. Mardanpour won this prestigious award to his work titled **DIC and Data Acquisition System for Experimental Verification of the Constructal Theory in Design of Multi-scale Aeroelastic Systems**. He will use constructal laws to gain more insight into "evolutionary design" for better good of the mankind.



## PROVOST'S AWARD FOR MENTORING GRADUATE STUDENTS, FIU, MARCH 2018 & NANOMATERIALS AND ENERGY PRIZE (BEST PAPER IN THE JOURNAL), INSTITUTE OF CIVIL ENGINEERS (ICE), UK, OCTOBER 2017: DR. ARVIND AGARWAL

The UGS Provost Award for Mentorship of Graduate Students recognizes excellence in the teaching and mentoring of graduate students outside the formal classroom experience. ICE awards authors from both industry and academia who have produced work judged by their peers to be of exceptional quality and benefit to the civil engineering, construction and materials science community. Dr Agarwal was bestowed these awards om 2017-18.



# 2017-2018 VISITING SPEAKERS

Speaker: **Dr. William G. Fahrenheit**, Missouri University of Science and Technology  
Title: **Improving the Elevated Temperature Fracture Toughness of ZrB<sub>2</sub> - Based Ceramics**

Speaker: **Dr. Yogendra Joshi**, Georgia Tech.  
Title: **Chip Cooling and Air Flow Management for High Performance, Energy Efficient Data Centers**

Speaker: **Dr. Carlos Lavernia**, Lavernia Orthopedics  
Title: **Trunnionosis in Total Hip Arthroplasty**

Speaker: **Dr. Dennis A. Signer**, Botswana International University of Science and Technology  
Title: **Tube Flow of Elasto-Viscoplastic Phase Change Materials**

Speaker: **Dr. Yang Yang**, University of Central Florida  
Title: **Electrochemical fabrication of nanostructured thin-film for renewable energy applications**

Speaker: **Dr. Gang Wu**, The State University of New York (SUNY) at Buffalo  
Title: **Atomic Iron Site Catalysts for High-Performance Platinum-free Cathodes in Advanced Hydrogen Fuel Cells**

Speaker: **Dr. Ramy Harik**, University of South Carolina  
Title: **Emergency of Additive Manufacturing Design Environments for Composite Structures in Aerospace Applications**

Speaker: **Dr. Mordechai Perl**, Ben-Gurion University of the Negev, Israel  
Title: **The Beneficial Effect of Full or Partial Autofrettage on the Combined 3-D Stress Intensity Factor for an Inner Radial Lunular or Crescentic Crack in a Spherical Pressure Vessel**

Speaker: **Dr. Yang-ki Hong**, Univ. Of Alabama.  
Title: **Computational Materials Science with Special Emphasis on Magnetic Materials and Electric Machines**

Speaker: **Dr. Dawanne Poree**, Program Mnager, Army Research Office  
Title: **Polymer Chemistry and Reactive Chemical Systems (A) in US Army Research Laboratory, Army Research Office**

Speaker: **Dr. Marc Madou**, UC Irvine  
Title: **CD Fluidics for Extreme Point of Care-EPOC**

Speaker: **Dr. Garret N. Vanderplaats**, Vanderplaats R&D, Inc.  
Title: **Design Optimization: History and Prospects**

Speaker: **Dr. Marcelo J. Colaco**, Federal University of Rio de Janeiro, UFRJ  
Title: **Kalman Filters, Particle Filters, Optimization and Response Surfaces and Bayesian Techniques/MCMC**

Speaker: **Dr. Helcio R.B. Orlande**, Federal University of Rio de Janeiro, UFRJ  
Title: **Kalman Filters, Particle Filters, Optimization and Response Surfaces and Bayesian Techniques/MCMC**

Speaker: **Dr. Donna Ebenstein**, Bucknell University  
Title: **Nanoindentation of Soft Biomaterials: Challenges and Advances**

Speaker: **Dr. Juejun Hu**, MIT  
Title: **Glass Integrated Photonics: a Crystal-clear Future**



NEW  
FACULTY HIRES

Dr. Daniela Radu

Dr. Radu received her BS in Chemical Engineering and PhD in Chemistry from Iowa State University. She has worked as senior research scientist in DuPont CR&D. She also served as tenured associate professor at Delaware State University. Her long-term vision is to develop a new generation of compositionally controlled nanostructured materials with desired geometrical features and defined surface chemistry, as building blocks for prototype device nanofabrication in each application. Currently she focuses on three integrated projects: *Chemically Programming Electronic Properties in Solution-Processed 2D Binary and Ternary Chalcogenides*, *Bandgap Engineering in Inorganic Semiconductors—Doped Inorganic Nanomaterials*, and *Light-Emitting Semiconductor Nanoalloys for Integrated Photonic Circuits*. Combining her decade-long experience in solution processed nanomaterials, thin film assembly and fabrication of functional devices, with the current developments in spectroscopic and optical analysis. The three projects are integrated in respect to materials fabrication, characterization and processing.



Dr. Alexandra Coso Strong

Dr. Alexandra Coso Strong works and teaches at the intersection of engineering education, faculty development, and complex systems design. Dr. Strong completed her doctorate in aerospace engineering at Georgia Tech in spring, 2014. While a doctoral student, Strong was a National Science Foundation graduate research fellow and a member of the Cognitive Engineering Center. The goal of her doctorate research was to improve students' abilities to think more broadly about complex systems design and to take into account stakeholder-related considerations within their design projects.



Dr. David Kelly

Dr. Kelly received his PhD degree from the School of Civil Engineering at the University of Nottingham in the United Kingdom. His research focuses on the development of advanced numerical techniques for hydro- and hydro-morphodynamic modelling in Coastal Engineering. Since finishing his PhD studies Dr. Kelly has worked in academia, both in the UK and USA and in senior industrial positions in both the UK and Canada. Over the past decade Dr. Kelly has gained a significant knowledge base through both developing and running a wide variety of numerical models. Throughout his time as a researcher, consultant and developer, Dr. Kelly acquired extensive professional experience in leading challenging commercial and research projects in both coastal and offshore marine environments. Dr. Kelly's numerical modelling skills has been extended to solve international range of marine engineering problems including: offshore wind turbine foundations, sub-sea structures, offshore breakwaters and reefs, seawalls, dredged sediment dispersion, beach- and coastline- evolution.



FACULTY  
RETREAT 2017

MME Retreat agenda  
Friday, October 20<sup>th</sup>, 2017  
DoubleTree Airport Hotel & Convention Center - 711 NW 72nd Ave, Miami, FL 33126

8.30 – 9.00	Hibiscus Room: Breakfast
9.00 – 9.05	North Foyer: Dr. Arvind Agarwal and Ms. Mabel Fernandez Welcome and introduction
9.05 - 9.30	Dr. Arvind Agarwal Chair's statement: state of the Department and vision
9.30 – 10.00	Dr. Benjamin Boesi Undergraduate Program report
10.00 – 10.45	Dr. Cesar Levy ABET
10.45 – 11.00	Hibiscus Room: Morning Break
11.00 – 11.30	Dr. Carmen Muller and Ms. Mabel Fernandez Industrial advisory board related discussions
11.30 - 12.00	Dr. Yiding Cao and Dr. Bilal El-Zehab Graduate program
12.00 – 1.00	Hibiscus Room: Lunch
1.00 – 1.45	Dr. Arvind Agarwal <ul style="list-style-type: none"><li>Research</li><li>Preeminence research application</li><li>New Faculty hiring</li></ul>
1.45 – 2.15	Dr. Arvind Agarwal New programs including online, China, India, and auxiliary program
2.15 – 3.00	Dr. Andres Tremante Student clubs and outreach
3.00 – 3.30 Tiziana Leoni	Dr. Arvind Agarwal, Ms. Mabel Fernandez, Ms. Social Media and website
3.30 – 4.00	Open for discussion and final remarks
4.00 – 4.30	Hibiscus Room: Reception





INDUSTRY  
ADVISORY BOARD

- Allan Arch
  - Antao Chen, PhD
  - Charles Tomonto, PhD
  - Ian Cobham
  - Santiago Lattanzio
  - Yuray Rodriguez
  - Orangel Vazquez
- 
- ***Our local South Florida industrial advisory board assists in evaluation of senior design projects and provides feedback for ABET.***
  - ***MME is in the process of creating a National Industrial Advisory Board (NIAB) to provide a greater visibility to the department, to improve our curriculum and the program at the national level.***

MAJOR RESEARCH  
PROJECTS IN MME

ENGINEERING RESEARCH CENTER IN CELLULAR  
METAMATERIALS



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 will use the latest multiscale 3D printing technologies to engineer scaffolds that guide cells to assemble into complex tissues that exhibit desired behaviors. The scaffolds will incorporate actuators to apply dynamic electrical and mechanical signals as well as cellular “glues” that include biological signaling molecules, all of which can be chosen to foster desired activity of the cells and tissue. The researchers will also employ optogenetics and other imaging techniques to monitor and control cellular activity. The ultimate goal is to fabricate personalized heart tissue that could be used in the shorter term to test the efficacy of drugs and eventually to replace diseased or damaged muscle after a heart attack.

The ERC’s ultimate goal is to advance nano-bio-manufacturing methods that could lead to large-scale fabrication of functional heart tissue, which could replace diseased or damaged muscle after a heart attack.

The ERC also aims to advance nano-bio-manufacturing methods that could lead to large-scale fabrication of functional heart tissue, which could replace diseased or damaged muscle after a heart attack. Illustration courtesy of Jeroen Eyckmans  
CELL-MET will be housed at Boston University. David Bishop, an ENG professor of electrical and computer engineering, a College of Arts & Sciences professor of physics, and head of ENG’s Division of Materials Science & Engineering, will direct the center. Two partner institutions—the University of Michigan and Florida International University—as well as six affiliate institutions—Harvard Medical School, Columbia University, the Wyss Institute at Harvard, Argonne National Laboratory, the École polytechnique fédérale de Lausanne in Switzerland, and the Centro Atómico Bariloche/Instituto Balseiro in Argentina—will offer additional expertise in bioengineering, nanotechnology, and other areas.

FIU PI: Dr. Arvind Agarwal



PRECISE ADVANCED TECHNOLOGIES & HEALTH SYSTEM FOR UNDERSERVED POPULATIONS



PATHS-UP is a new, innovative partnership created to develop advanced technologies to prevent, delay the onset, and manage diabetes and cardiovascular disease. Their mission is to engineer transformative, robust and affordable technologies to improve healthcare access, enhance the quality of service and life, and reduce healthcare costs. To recruit and educate a diverse group of scientists and engineers who will lead the future in developing enabling technologies to improve health in underserved communities.

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The main challenges are chronic conditions such as diabetes and cardiovascular disease are a leading cause of morbidity and mortality. Every 30 seconds, one American will be diagnosed with diabetes and another will suffer a coronary event. Underserved communities in every state have higher prevalence and less access to equitable healthcare services. Because of this, many people in these communities go undiagnosed or are diagnosed late, which can lead to serious consequences. Finding solutions to this problem requires both the development of transformational health technologies and systems, and a paradigm shift in how these technologies are integrated into communities. Beyond the obvious societal health impact of the center's systems, the students, post-docs and faculty nurtured by the center's intellectual community will also be a significant outcome of PATHS-UP.

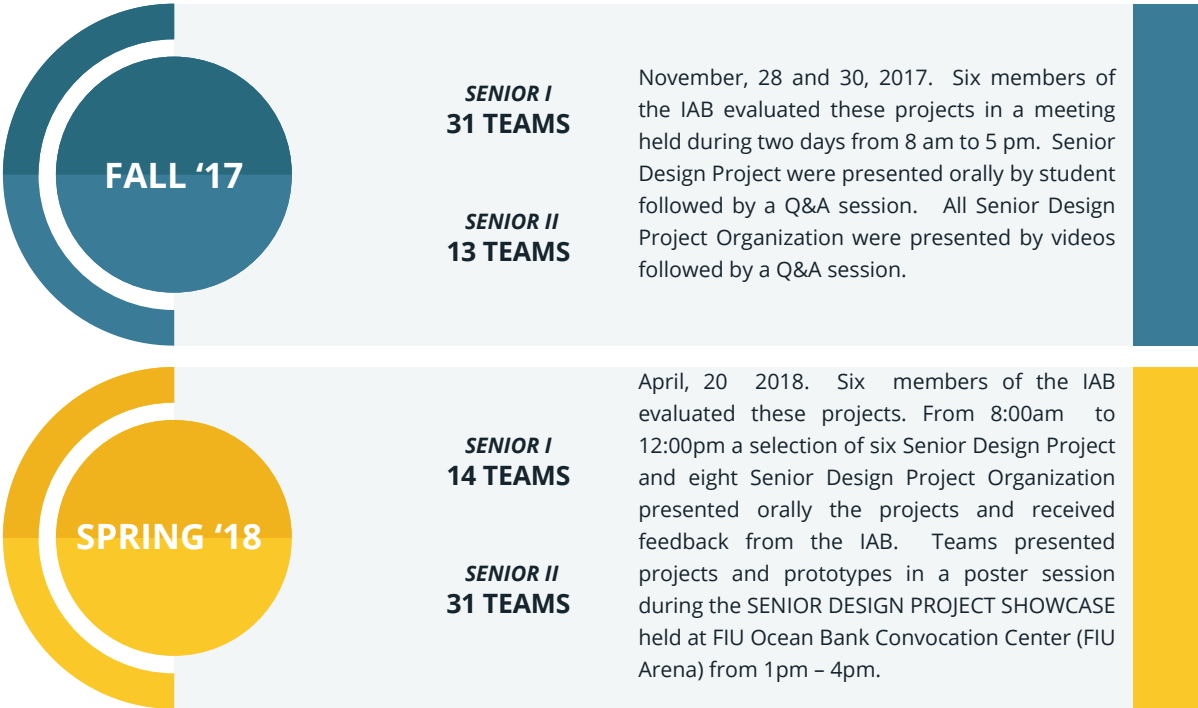
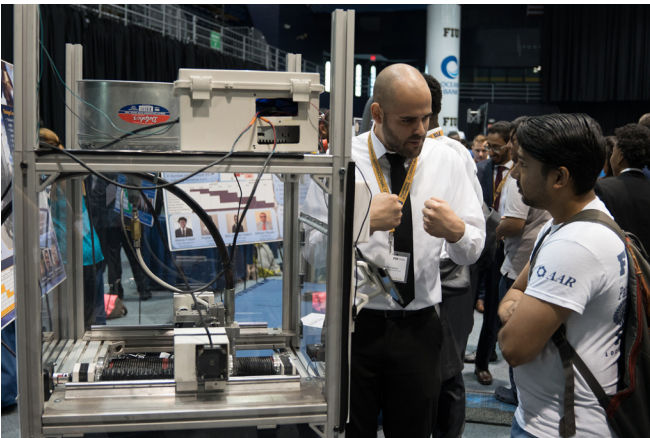
FIU Co-PI: Dr. Peggy Wang

SENIOR DESIGN PROJECT SHOWCASE

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.

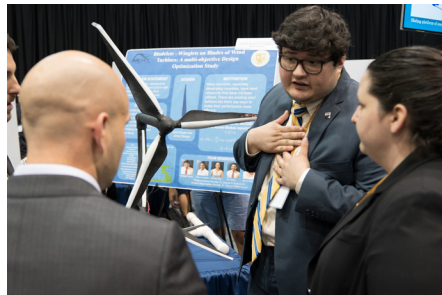
The capstone design project emphasizes on teamwork as an integral part of the design process. All the projects will be presented in a department wide conference at the end of the semester and evaluated by the Industrial Advisory Board and faculty.

The spirit of the Capstone Design Project is provided by ABET (the Accreditation Board of Engineering and Technology), which accredits all of the national engineering programs.





TEAM	FALL 2017 Senior Design Project
1	<b>Cardboard Payload Delivery Drone</b> Michael Weston Fleming, Zeeko Johnstone, Kishan Ramesh Kalpoe. <i>Advisor: Dr. Beladi</i>
2	<b>Asteria PicoSat</b> Anthony Fernandez, Kristen Mikayla Kim, Jesse Viera. <i>Advisor: Dr. Tansel</i>
3	<b>SkySAT: Optimization of NEE CubeSAT Subsystems</b> Jesus Martinez, Ramon Orge, Yandy Rodriguez Ramos. <i>Advisor: Dr. Tansel</i>
4	<b>RAPID Response Aircraft for Precise International Drop</b> Alexand Nicholas Gibson, Andrews David Guadron, Andrey Khlapov. <i>Advisor: Dr. Beladi</i>
5	<b>Snow Traction System</b> Daniel Dubois, Leannette Pio, Ryan Anthony Van Der Eijk . <i>Advisor: Dr. Boesl</i>
6	<b>Lake Water Condenser Unit</b> Ernesto Batista, Hilario Antonio Hernandez, Grecia Rodriguez Dominguez. <i>Dr. Tremante</i>
7	<b>Multiple Still Solar Distiller</b> Ann Kayana Blanchard, Ross Engstrom, Patrick Michael Robinson. <i>Advisor: Dr. Beladi</i>
8	<b>NEDD: Nautical Emergency Desalination Device</b> James Ashe III, David Ricardo Lara, Andres Ramos. <i>Advisor: Dr. Tremante</i>
9	<b>Personal Solar Powered Vehicle</b> Abdulrahman Alsafteh, Bryan Miyasato, James Kacel Momperousse. <i>Advisor: Dr. Tremante, Dr. Leonardo Bobadilla and Col. Jerry Miller</i>
10	<b>Portable Solar-Wind Turbine</b> Juan Alejandro Aguilar, Nelson Azcue, Adam Sibiski. <i>Advisor: Dr. Tremante</i>
11	<b>Dual Energy Solar Collector</b> Juan Bernabeu, Jorge Alejandro Gramcko, Adrian Adolfo Jarrin. <i>Advisor: Dr. Tremante</i>
12	<b>Propulsion System for FDOT Trolley</b> Roger Bustamante, Rodolfo Guerrero, Kevin Martinez. <i>Advisor: Dr. Tremante</i>
13	<b>Portable Hydroelectric Power Plant</b> Michael Eduardo Carrillo, Edward Kevin Gomez, Maria Victoria Loreto <i>Advisor: Dr. Tremante</i>



TEAM	FALL 2017 Senior Design Project – Organization / SPRING 2018 Senior Project Design
1	<b>Water Leak Detection System</b> Ascanio Tiffany , Forero Stephanie Maurin , Medina Jose Alberto , Olaya Alexsandra Paola. <i>Advisor: Dr. Tremante</i>
2	<b>Linear Actuator Test Stand</b> Cascarano Francesco Giuseppe, Martinez Rangel Frank Antonio, Montes Jr Jose Ernesto, Perez Carlos Eduardo. <i>Advisor: Dr. Tremante</i>
3	<b>Portable Modular Multi-Fluid Turbine</b> Baez Yanet, Esmail Abdulrahman A A D, Nunez Joshua, Whyte Orett. <i>Advisor: Dr. Tremante</i>
4	<b>Integrated Hybrid Engine Generator</b> Elsergany Karim, Gonzalez Alexandra, Velasquez Jr Walter Jonathan, Wilcox Grant, Yopez Alejandra Virginia. <i>Advisor: Dr. Tremante</i>
5	<b>The ComboCounter: A heavy punching bag training tool</b> Asgar Tahsin Ali, Dolmetsch Tyler, Sherbacoff Noah, Usui Sonomi Lily. <i>Advisor: Dr. Tansel</i>
6	<b>Rapid Deployment Micro-Class Aircraft</b> Robles Daniel, Santos Manuel Alejandro, Seisdodos Carlota, Tsang Ka Wing. <i>Advisor: Dr. Tsukanov</i>
7	<b>Aerodynamics Kit for 2018 FSAE Prototype</b> Carlock Kevin Alexander, Jones Ana Beatriz, Macias Humberto Maximiliano, Martinez Eduardo <i>Advisor: Dr. Tremante</i>
8	<b>DeskPak</b> Benavides Eric, Groce Loren, Labastille Brandt Hosly. <i>Advisor: Dr. Boesl</i>
9	<b>Drone Mounted IED Detection Device</b> Ferreira Andres Nicolas, Fisher Nicole, Pooran Ryan Varun, Ruz Damian Joseph. <i>Advisor: Dr. Tremante</i>
10	<b>Solar Thermal Electric Energy System</b> Gorrin Anthony, Matin Sajjan, Pozo Aldo Martin. <i>Advisor: Dr. El-Zahab</i>
11	<b>SPR: Solar Portable Refrigerador</b> Leo-Reid Amarli Schuber, Marin Maria Camila, Rendueles Ricardo Ryan, Swigert Zachary. <i>Advisor: Dr. Cao</i>
12	<b>SAE AERO Design Competition</b> Ho Lung Matthew Kyle Ibanez Martin, Soto Cesar Frangelico, Valencia Juan. <i>Advisor: Dr. Tsukanov</i>
13	<b>Advanced A/C unit for logistic trucks</b> Ahmed Syed, Duque Joseph Melo, Galeano Ivan Dario, Lewis Jazyn Kyler. <i>Advisor: Dr. Cao</i>
14	<b>Bladelets - winglets on blades of wind turbines: a multiobjective design optimization study</b> Diaz Kathryn, Jones Eric, Robson Nicole Elaine, Ruales Santiago, Gogins Brianna. <i>Advisor: Dr. Dulikravish</i>



15	<b>Fire Extinguisher - Drone</b> Alenezy Abdulaziz, Celemin,Carlos A, Dimitri Pietro Demetro, Tor-mo Jose Miguel. <i>Advisor: Dr. Tansel</i>
16	<b>Water Jet CNC Machine</b> Gonzalez Christian, Reyes Ana, Riano Erick, Rodriguez Oriel. <i>Advisor: Dr. Boesl</i>
17	<b>Test Bed for Waste Water/Heat Recovery for mFue gases.</b> Alajmi Mohammad S A TH H, Frank Jr Pradel Richard, Fraser Akeva, Reyes Alfredo. <i>Advisor: Dr. Lin</i>
18	<b>Novel Improvement to a Condenser Unit for HVAC Applications</b> Almosallam Wafaa S A A A, Escobar Michael Javier, Lara Miguel Eduardo, Wedderburn Mark Dedrone, Eboka Elizabeth <i>Advisor: Dr. Lin</i>
19	<b>Passion Fruit Pulp extration Machine</b> Briceno Ortigosa Manuel Enrique, Carpico Alfredo Mi-guel, Martinez Jesus Armando, Rotterman Yoel. <i>Advisor: Dr. Boesl</i>
20	<b>Metal free Biodegradable Battery</b> Alharim Mohammed B, Jardine Joseph Andrew, Solorzano Jr Roberto , Jeffrey Julius, Dhari Alotibi. <i>Advisor: Dr. Wang</i>
21	<b>Shell Eco Marathon</b> Ahmed Naseem, Castillo Ranjkdhall, Rivera Fiorella, Rubio Laura. <i>Advi-sor: Dr. Tremante</i>
22	<b>Patient transfer system for hospital beds</b> Bu pons Erick, Gallegos Leonardo, Herrera Rolando Jose, Zotti Rossana , Vazquez Alberto Luis. <i>Advisor: Dr. Tansel</i>
23	<b>The Nautilus ROV Competition</b> Delagandara Adil, Kulwatno John P, Salgado Ivan Jesus, Weck-ering Julien Daniel. <i>Advisor: Dr. El-Zahab</i>
24	<b>Easily Deployable Traffic Signals (EDTS)</b> Abduljabb24ar Mohannad Abdullah A, Alzalzalah Saidhasan, Penaloza Gutierrez Juan Jose, Robles Erick Jose, Abed Ali. <i>Advisor : Dr. Tansel</i>
25	<b>FSAE Engine Dynamometer</b> Menendez Andrew, Reano Carlos, Ricknauth Jonathan Amit, Rosenqvist Alexander John. <i>Advisor: Dr. Tremante</i>
26	<b>Cantilever Mass Sensor for High Temperature Plasma Spray System</b> Antillon Melania, Bustil-los Jenniffer, Gil Daniela Sofia, Ortega Jr Jose Ignacio. <i>Advisor: Dr. Boesl</i>
27	<b>Autonomous Luggage Assistance Vehicle</b> Garcia Alejandro, Muchacho Jose, Pepino Juan Artu-ro, Tejera Candurin Jorge Miguel. <i>Advisor: Dr.</i>
28	<b>Solar Powered, Ice Storage A/C System</b> Aloma Andres, Rodriguez Manuel, Vargas Matthew Steven, Vilaire Eric. <i>Advisor: Dr. Tremante</i>
29	<b>Improving Firefighter Communications in High-Rise Buildings</b> Fernandez Daniel Virgillio, Pie-dra Alexander Michael, Salgo Matias Federico, Simoesponce Tristan. <i>Advisor: Dr. Boesl</i>
30	<b>Spotter Nkama Jean Pierre Mana, Saintvil Gabriel J, Spence Patrick Lee. Advisor: Dr. Beladi</b>
31	<b>Double Workout Machine</b> Alaskari Khaled, Bernaba Andrew, Geddes Arthur Morris. <i>Advisor: Dr. Beladi</i>

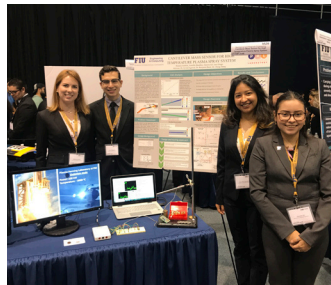
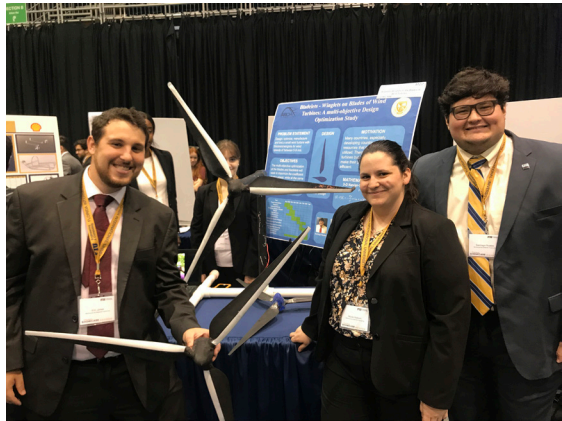


TEAM	SPRING 2018 Senior Design Project – Organization
1	<b>Roller Coaster Train Car Detachable Connection Mechanism</b> <b>Students:</b> Nicholas Delgado, Ryan Morrison, Vanessa Nunez, Chris Phillips   <b>Project Advisor:</b> Dr. Ibrahim Tansel, Prof. Anthony Abrahao
2	<b>GoFly Prize; The creation of a VTOL personal flying device</b> Christopher Lara, Emory Mongbeh, Michael Porrua, Marco Tomaselli   <b>Project Advisor:</b> Dr. Andres Tremante, Prof. Richard Zicarelli, Prof. Igor Tsukanov
3	<b>Ultrasonic Material Recognition</b> Pedro Moncada, Chad-Anthony Campbell, Irak Ferreira   <b>Project Advisor:</b> Dr. Benjamin Boesl
4	<b>3D Printed Humanoid</b> Cody DiBella, Delva Felissaint, Elison Garcia , Eric Correa, Hillal Ibiyemi   <b>Project Advisor:</b> Dr. Benja-min Boesl
5	<b>Ablative rocket nozzle design</b> Tyler Daniel, Jimmy Bautista, Sebastian Molina, John Pham   <b>Project Advisor:</b> Dr. Benjamin Boesl
6	<b>Human Powered Water Distiller</b> Michael Dorado, Nicholas Augustin, Daniel Carvajal, Matthew Warheit   <b>Project Advisor:</b> Dr. An-dres Tremante
7	<b>Underwater Hull Cleaning Robot</b> Gerardo Rodriguez, Esmeralda Reyes, Nicolas Perez, Zamir Piedrahita   <b>Project Advisor:</b> Dr. Ibrahim Tansel
8	<b>Air conditioning System powered by green energy</b> Jose Colmenares, Luis Cuesta, Sandro Gonzalez, Christian Reyes   <b>Project Advisor</b> Dr. Andres Tremante
9	<b>Aircraft Hydraulic Service Cart Adapter</b> Chelsie Ramos, Frank Belzunegui, Tien Hoang, Jose Barsallo, Oscar Diaz   <b>Project Advisor:</b> Dr. Ben-jamin Boesl
10	<b>10 An A/C Cost improvement design using Variable Air Volume (VAV) (Report)(Video)</b> Javier Navaza, Osmin Diaz, Jose Muchacho, Sergio Fuentes, Abdulaziz Alsharhan   <b>Project Advisor:</b> Dr.Charlie Lin





11	<b>A Sliding Transfer Platform from Car Seat to Wheelchair</b> Nicholas Bernal, Daniel Vasquez, Tariq Attallah, Abdultayeb Almasloom   <b>Project Advisor:</b> Dr. Ibrahim Tansel
12	<b>Underwater Personal Propulsion System</b> Students Amir M. Fadil, Bernie, Christian Rivera, Zaid   <b>Project Advisor:</b> Dr. Ibrahim Tansel
13	<b>Central Energy Plant Monotoring Sysyem</b> Facundo Morales, Lawrence Crisler, Bryan Gutierrez, Johnathan Ricknauth   <b>Project Advisor:</b> Dr. Charlie Lin
14	<b>Chiropractic Bed</b> Jorge Ramirez Jordan Tanko Isaias Jasso Hamad Alomar   <b>Project Advisor:</b> Dr. Ibrahim Tansel



## FUTURE GOALS

1. To increase the 4 year FTIC graduation rate to 30%
2. Graduate student recruitment
3. Faculty and lab manager hiring
4. Complete redoing of the MME website to match current university standards
5. Fundraising from MME alumni with assistance from the development office
6. Strengthening National Industry Advisory Board to add new members
7. MME Conference room upgrade to an e-learning classroom with video conferencing and video capture facilities
8. To establish a preeminent research program and improve research funding

## KEY PERSONNEL



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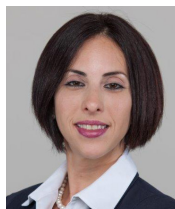
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