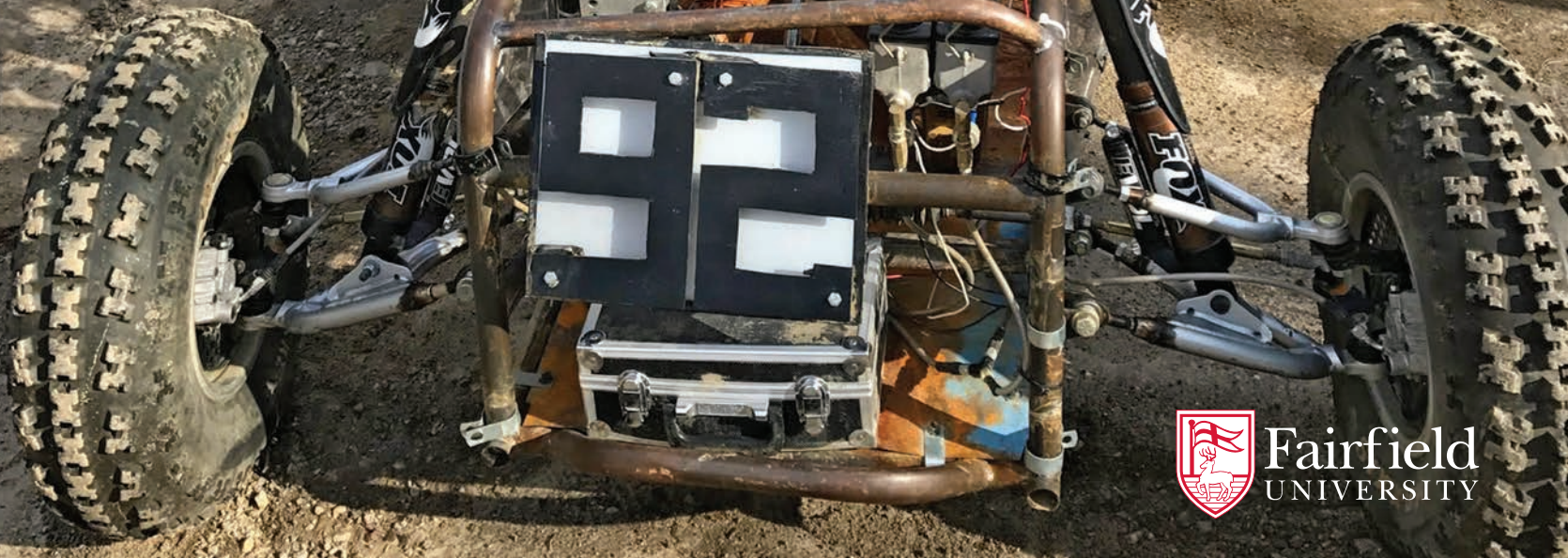


# School of Engineering NEWS

Spring 2018

## Fairfield Stags Racing

embarks on an off-road adventure. — Page 13



Fairfield  
UNIVERSITY

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## Message from the Dean

Dear Colleagues,

This is my final letter as Dean of the School of Engineering (SOE) at Fairfield University. Everyone in the SOE can be proud of the progress we have made over the past five years. Our faculty, advisory board, and University administration have collaborated to develop a strategy and allocate necessary resources to make our success possible.

We have accomplished our five-year goals for growth and retention in our undergraduate programs, which have been reconfigured, redefined, and are now fully accredited. We have successfully created new high-impact activities, including Engineers Without Borders, an SAE Baja Buggy team, and an on-campus FIRST Robotic Competition.

Partnering with Servo Robot, Sikorsky, the FAA, IBM, Saugatuck Electric, and Landsdowne Labs, we have initiated a Professional Development Series and expanded our applied research projects. Additionally, we have reinvigorated and matured our assessment and evaluation processes.

We are at a turning point for the SOE, and it is time for the next step. How will we go forward? I believe the opportunities

in higher education for engineering are nearly unbounded as long as we continue to promote the design and development of programs that address society's greatest challenges. Major reforms in undergraduate engineering education are taking hold in Europe and the Middle East, and U.S. engineering programs should take note.

In a recent interview published by ABET, some of the recognized leaders in undergraduate engineering education in the U.S. discussed the conceptual directions that we need to move. Undergraduate engineering education capacity is a great need in the world, in the U.S., and specifically in Connecticut. We need to increase projected STEM graduates by 33% worldwide over the next ten years through greater matriculation and retention. In Connecticut, alone we currently graduate 1000 fewer engineers than industry needs each year.

The next SOE leader at Fairfield University will be called on to strengthen the high-impact activities created over the last five years while leading the effort to grow and sustain our undergraduate programs. Additionally, he or she will need to focus

on the organic growth of the graduate student population as our applied research collaborations continue to expand. Constraints that don't readily lend themselves to technical solutions will also challenge Fairfield's next SOE leader: global issues facing international graduate students; external competition in a complex, competitive regional market; and internal efforts to communicate the unique importance of an engineering education.

Congratulations to my friends, my colleagues, my corporate partners. Thank you so much for your support, and I look forward to the opportunities and successes of the next five years!

Sincerely,

A handwritten signature in black ink that reads "B. Berdanier". The signature is written in a cursive, slightly slanted style.

Dr. Bruce W. Berdanier, PE, LS, FASCE  
Dean of Engineering

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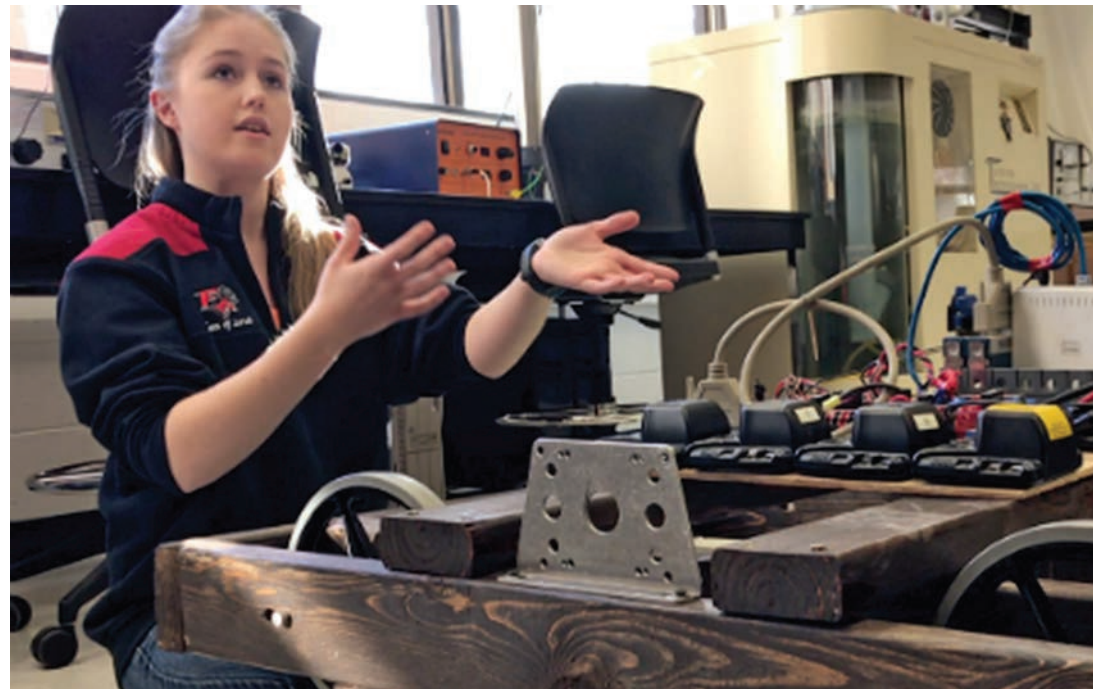
## Engineers Till the Fertile Soil of Imagination

This past winter, Emily Yale '18 and John O'Neill '18 shared a sneak peek of the first prototype they've built for a robot designed to revolutionize the way soil sampling is conducted in the agricultural industry. The robot, referred to as Land Maverick, is the product of their year-long senior design project in collaboration with Jose Osorio '18 and Ryan Ferreira '18.

In addition to building a prototype from the ground up, doing research at local farms to inform design and functionality, and programming the robot to move on its own, the students are also building a business plan to launch Land Maverick. As part of Fairfield's annual shark-tank style entrepreneurship competition, the StartUp Showcase, Team Land Maverick is one of only four teams invited to make their business pitch – and compete for seed money – in front of a panel of investors this spring.

**RYAN MUNDEN, PHD**, associate dean of engineering and Land Maverick's faculty advisor said, "Agriculture has benefited dramatically from technology to increase productivity and meet the global demand for food. Land Maverick builds on the trend of using science to improve agricultural practices versus relying on trial and error. With Land Maverick, farmers will be able to understand what a plant needs to increase crop yield."

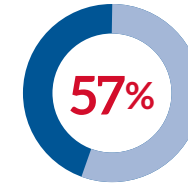
As Yale explained, in addition to increasing crop yield, Land Maverick will also inform farmers of the best time to fertilize their fields which will mitigate the impact of runoff water on local ecosystems. The robot will also give farmers a reliable way to test which nutrients are in their fields and what might be lacking. Soil sampling will be completed in hours, compared to current methods that take weeks, and results will be ready the same day versus having to wait for lab results to come back.



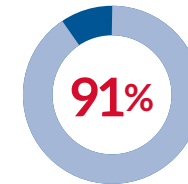
Emily Yale '18 with her team's prototype for Land Maverick

Yale proposed the idea for Land Maverick last spring as a way to combine her interest in robotics with her interest in agriculture. She has extensive experience with robotics through her participation as a youth mentor in local FIRST Robotics competitions, and she is also a member of 4-H which has exposed her to farms and has contributed to her interest in agriculture.

## "The expert in anything was once a beginner." – Helen Hayes



of Fairfield University SOE students have two or more internships



of engineering students have at least one internship



PLACEMENT RATE, six months after graduation (87.5% employed + 12.5% full-time graduate program enrollment)



Median Starting Salary for Fairfield University SOE Graduates

## Student Engineers Pitch Solutions to Local Tech Firms

A device that makes drug testing more humane, a system that helps make air traffic control safer, and a machine that makes jewelry manufacturing more efficient are just a few of the recently pitched Fairfield University SOE senior design projects.

Student teams must send formal proposals to either a department of the University or an outside company before beginning research. Once a proposal is accepted, the team works for two full semesters – through multiple design phases – to develop plans and/or prototypes. Funding for research comes mainly through industry donations, NASA, and the Hardiman-Lawrence endowment.

Each spring, innovative projects are pitched to classmates, professors, and industry mentors that in the past have included Precision Combustion, Inc. of New Haven, Conn., ASML of Wilton, Conn., Covidien LP, Northeast Laser & Electropolish of Monroe, Conn., and the Federal Aviation Administration.



After the final presentation, student projects live on in multiple ways. Those completed for an outside organization are turned over for implementation. Some projects are earmarked for further development, and others go on to participate in Fairfield's annual entrepreneur competition, StartUp Showcase.

## 2017-18 SOE Senior Design Projects

Student Senior Design teams received funding through the Hardiman-Lawrence research funding endowment to support their research and development work with SOE faculty.



### Degree Key

C: Computer Engineer  
E: Electrical Engineer  
M: Mechanical Engineer  
S: Software Engineer

#### TEAM 1 - Air Pollution Visualization App

Advisors: Dr. Ad. Rusu and Kourosh Karimkhany (The Weather Company, IBM) Julian, Peter – S  
Kwasnaza, Nicole – C  
Walsh, Brian – S  
Richardson, Matthew – CS

#### TEAM 2 - Data and AI-driven Dashboard for Commodities Trading

Advisors: Dr. Ad. Rusu and Chris Gorman (Saugatuck Energy, Southport CT) O'Malley, Lauren – C  
Knight, John – C  
Nordstrom, Bradley – S  
Zazula, Nicholas – S

#### TEAM 3 - Gas Storage for Solar Powered CO2 to Fuel

Advisors: Dr. S. Etemad and Dr. J. Weissman (PCI, North Heaven CT) Ammon, Ethan – M  
Maini, Joseph – M  
Calderoni, Lauren – M  
Menz, Johnathan – M

#### TEAM 4 - Advanced Adhesive Bonding Application

Advisor: Dr. A. Judge (ASML, Wilton CT) Santoro, Jack – M  
Caratelli, Nicholas – M  
Moroski, Thomas – M  
Klippel, Samuel – M

#### TEAM 5 - Medical Guide Wire Proximal End Deburring Machine

Advisors: Dr. M. Zabinski and Karim Kharbouch (Northeast Laser & Electropolish, Monroe CT) Adamczyk, Christian – M  
Colliard, Peter – M  
Crowley, Jack – M  
Davis, Jerome – M

#### TEAM 6 - Automated Gearbox Design

Advisor: Dr. S. Sundarram Panara, Nicholas – M  
Giordani, Marco – M  
Mark, Matthew – M  
Fishbaugh, Ryan – M  
Lee, Matthew – E

#### TEAM 7 - RF Energy Harvesting for Embedded System Application

Advisor: Dr. U. Balaji Salazar, Crystal – E  
Tello, Antonio – E  
Amarante, Philip – C Dejean, Jeff – E

#### TEAM 8 - Magnetic Cell Sorting Chamber

Advisor: Dr. S. Freudzon and Dr. Alicia Petryk (University of Bridgeport) Niro, Sarah – B  
McHugh, Kerry – B  
Taggart, Joseph – M  
Emsley, Jordan – M

#### TEAM 9 - Pericardial Sac Retractor

Advisor: Dr. S. Freudzon Donohue, Kaitlin – B  
Egan, Jennifer – B  
Higgins, Kathryn – B  
Moreno-Villatoro, Milgian – M

#### TEAM 10 - Field Nutrient Mapping Rover

Advisor: Dr. R. Munden Yale, Emily – M  
O'Neill, John – M  
Ferreira, Ryan – M  
Osorio, Jose – M

#### TEAM 11 - Portable Solar Desalinator

Advisor: Dr. M. Safari Ficaro, Christina – M  
Laska, Kacper – M  
DeBiase, Nicholas – M  
McGovern, Ryan – M  
Li, Run – M

#### TEAM 12 - Automatic Spherical Bearing Torque Loosening Machine

Advisors: Prof. J. McFadden, Prof. S. Etemad (Fairfield University), Mr. Jim Mitsch (Manager), Mr. Jarek Hyjek (Sr. Automation Engineer) (RBC HEIM Bearing) Caiafa, Ginamarie – M  
Alderisio, Jack – M  
Savickas, Kimberly – M  
Delaney, John – M

These teams will present project posters at the American Society for Engineering Education (ASEE) Northeast Section Conference at University of Hartford, CT in April 2018.

“Success is where preparation and opportunity meet.” – Bobby Unser

Students at Fairfield University's School of Engineering receive an education based on one-on-one interaction with dedicated faculty and close collaboration with like-minded peers. They don't just learn how things work – they learn how to make them work better. This engaging, interactive approach gives students the necessary training and confidence to solve the world's engineering problems with creative and effective solutions.

#### ENGINEERING STUDENT ORGANIZATIONS AND SOCIETIES:

Engineers Without Borders (EWB)  
Society of Women Engineers (SWE)  
Institute of Electrical and Electronics Engineers (IEEE)  
Society of Automotive Engineers (SAE)  
Tau Beta Phi (Engineering Honor Society)  
American Society of Mechanical Engineers (ASME)

#### UNDERGRADUATE PROGRAMS OFFERED:

B.S. in Bioengineering  
B.S. in Computer Engineering  
B.S. in Computer Science  
B.S. in Electrical Engineering  
B.S. in Mechanical Engineering  
B.S. in Software Engineering

# TOP 2%

Fairfield University's engineering program\* is among the **Top 2%** in the country, according to College Factual. \*Along with our business and nursing schools.

#### Graduate Programs Place Alumni at Cutting Edge of New Technology

Master of Science programs at Fairfield University's School of Engineering provide the educational foundation engineers need to build a dream career. Skilled faculty teaches how to better understand complex engineering issues within a global context, offering students the knowledge and confidence needed to solve the world's engineering problems.

#### GRADUATE PROGRAMS:

- Electrical and Computer Engineering
- Management of Technology
- Mechanical Engineering
- Software Engineering
- 5-Year BS/MS Engineering Programs
- Certificate Programs



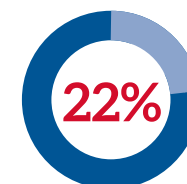
**7%** increase in first-year engineering applications

**22%**

of SOE undergraduates are women

**70%**

increase in transfer engineering applications



of SOE undergraduates are under-represented minority students



**12:1** undergraduate student-to-professor ratio

## For Those Hardwired to Change the World

### Engineering Students Explore Exciting Career Opportunities

In February, the SOE's Professional Development Series program partnered with Fairfield's Academic & Career Development Center to provide engineering students with the exciting opportunity to travel and engage in a variety of professional development programs. With a focus on career advancement, internship building, and networking, Fairfield students met and worked with alumni and industry professionals at Medtronic, BL Companies and ASML.

At BL Companies, a provider of integrated services relating to architecture, engineering, and the environment, students met mechanical, electrical, and architectural engineers.

Mechanical engineering major Sebastian Useche Rosania '20 stated "This was an eye-opening experience for me. I knew that mechanical engineers had a broad spectrum to choose a field of work, and visiting BL



Companies showed me a side of engineering that I didn't know was there."

### Engineering Conference Generates Big Ideas and Connections to Home

In Oct. 2017, a group of five engineering students traveled from Fairfield to Austin, Tex. with Marcia Arambulo Rodriguez, assistant dean of the School of Engineering, for the Society of Women Engineers (SWE)'s annual WE17 conference.

With more than 10,000 attendees, WE17 is the world's largest conference and career fair for women in engineering and technology fields. This year's three-day event featured hands-on workshops that encouraged participants to think in new ways.

Both Christina Ficaro '18 and Liliana Delmonico '20 found the career fair – with over 300 exhibitors from diverse engineering fields – to be the most rewarding part of the conference, but for opposite reasons. Ficaro said that "connecting with female engineers from amazing companies" helped solidify her career path, and revealed that "I now know that I would like to pursue a career in aerospace engineering."



The career fair showed Delmonico that having a less well-defined path is fine, too. Of the women she met, she discovered that "some received their degree in electrical engineering and now work in biotech companies. Some had clear visions of their career paths after undergrad and some did not. This uncertainty was inspiring to me, as someone who is still unsure where she wants to take her bioengineering degree."

## "Only a life lived in the service to others is worth living" – Albert Einstein

*U.S. News & World Report's* 2017 Best Colleges rankings recognized Fairfield University's Service Learning programs among the best "Academic Programs to Look For." The service learning accolade recognizes schools that integrate community service and required student course work.

### Engineering Students Donate Mini-Library to Bridgeport School

In May 2017, members of the Fairfield University chapter of Engineers Without Borders (EWB) devised and constructed a mini-library for Bridgeport, Conn. students at the Cesar A. Batalla Elementary School. "EWB is all about utilizing engineering to build and implement various systems for the communities that need them," Christine Ficaro '18 explained. The small, free-standing wooden bookcase is based on a 'take-a-book, give-a-book' system and was painted by the Batalla School's HOPE club with the intent of promoting community literacy.

Pictured: (l-r) Eric Jiang '20, Kacper Laska '18 and Christina Ficaro '18 with their mini-library at the Cesar A. Batalla School in Bridgeport, Conn.



### Girl Scouts Visit Fairfield for STEM Day

Fairfield University's Society of Women Engineers (SWE) hosted STEM Day for 60 Juniors and Cadettes of the Girl Scouts of Connecticut in April 2017.

The Girl Scouts rotated between four activities: creating a penny battery, a coding session, building a lung replica, and a Lego teambuilding event. Fairfield's student SWE leaders planned the event to introduce girls in grades four through eight to elements of electrical, software, and biomedical engineering, and to encourage them pursue STEM studies.

## LIFELONG LEARNER: Kim Sasso AS '99, BS '12, MS '16



As a child growing up next to Sikorsky Airport in Stratford, Conn., Kim Sasso AS'99, BS'12, MS'16 was fascinated by aircraft taking off and landing nearby. She remembers the thrill of sneaking her bicycle onto the runway, only to be chased off the tarmac by frantic Sikorsky employees. Back then, she couldn't have imagined where her fascination with flight – and lot of hard work – would take her engineering career.

In that respect, Sasso is like many of her classmates who have graduated from Fairfield's School of Engineering (SOE) programs. Today's world of high technology is evolving at such a rapid pace that well-trained engineers with a passion to succeed find their careers taking off in directions they never dreamed of – many times in industries that didn't yet exist – when they first began their studies.

Sasso was attending night classes on a full scholarship to Bridgeport Engineering Institute (BEI) when the school was acquired by Fairfield in 1994. She received her associate in science degree in electrical engineering from the University in 1999. Sasso worked full-time in a variety of engineering and support technician roles — and also raised her family – while completing additional coursework toward a bachelor of science degree at night.

In 2008, Sasso landed a job at a biotechnology company called 454 Sequencing in Branford, Conn. In her role as Senior Product Engineer, she worked on cutting-edge DNA sequencing instruments. Her work took her across the country and around the world.

When 454 Sequencing closed in 2013, Sasso returned once more to Fairfield's

classrooms, this time to pursue a master's degree in electrical and computer engineering. She later accepted a project engineer position at United Technologies, working as the leader on the Space Systems team that engineered critical environmental controls and life support systems aboard NASA's Orion spacecraft.

This equipment will be crucial to crew and craft survivability as Orion prepares to venture further into space than ever before... with the ultimate goal of one day carrying human explorers to the planet Mars.

The summer after completing her MS degree in 2016, Sasso took a new position at UTC Aerospace Systems (UTAS) and was transferred to Charlotte, N.C., where her team of eight provides best-in-class technical support for vital UTAS products aboard the fleets of key airline customers including Delta, American Airlines, and the United Parcel Service.

Perhaps no other student has witnessed the evolution of the SOE more closely than Sasso, who says, "I've seen the engineering program at Fairfield grow, and I could never have envisioned being where I am today without it."

## INTERNATIONAL SUCCESS: David José MS'16

While Kim Sasso commuted to Fairfield University from just a few towns away, David José's graduate school education began in 2014 with an 8,300-mile journey from a Jesuit college on the southeastern coast of India. It was the first time he had ever left his native country.

Fairfield's SOE first came to José's attention while completing his undergraduate degree in mechanical engineering at Loyola ICAM College of Engineering and Technology (LICET), in Chennai, India.

Phone conversations with Shahrokh Etemad, PhD, who is a professor and chair of the Mechanical Engineering Department, and Bruce Berdanier, PhD, dean of Fairfield's School of Engineering, convinced David that Fairfield was the place for him.

José's leadership skills quickly made an impression in Fairfield's classrooms, labs, and community. As a teacher's assistant in the School of Engineering, he designed experiments and lab assignments for undergrad students.

As a research assistant, his favorite part of collaborating on nanotech projects was "sourcing parts from different companies and countries, then seeing the whole system come alive."

Elsewhere on campus, José's leadership skills were also evident, in his role as vice president of the Indian Graduate Student



Association (IGSA) and in his involvement with the Jesuit Universities Humanitarian Action Network (JUHAN) – a joint service collaboration between Georgetown, Fordham, and Fairfield Universities.

"The IGSA and JUHAN were platforms I could use to give back to the greater community," José said. "More than being an engineer, I love to be human first. Helping people makes life worth living."

Honoring David with Fairfield's 2016 Graduate Students Service Award, came as a surprise to no one except José himself, "I just did my thing, worked hard, and I would say I was pleasantly surprised."

Today, José works as an application engineer at Omega Engineering in Norwalk, Conn., a leading manufacturer and distributor of sensing solutions. The technical knowledge and teaching skills he learned at Fairfield's

SOE are put to use every day at Omega in a job José describes as "applying engineering concepts and recommending the design of products to suit the requirements of our end users."

Not surprisingly, both Kim Sasso and David José continue to give back to Fairfield, most recently by participating in an Alumni Career Panel for undergraduate and graduate engineering students.

When asked what advice José would give to students interested in engineering --- particularly those coming to Fairfield from abroad, he said he would tell them, "Look within yourself, go look in the mirror; if you see a fier e spirit that is willing to work hard and make sacrifices while pursuing new adventures, then nothing can stop you."

### DOUG LYON

**Funding:** Kickstarter funding of \$5,800 to procure materials for a microcontrollers laboratory experience merging art and technology, while enabling students to explore digital audio effects and computer music.

**Publications:** Douglas A. Lyon “Jogl and Java3d,” *Java EE Journal*, Feb. 15, 2018 (<http://j2ee.ulitzer.com/node/4232538>).

### JAMIE MACBETH

**Awards:** Named Elizabeth DeCamp McNerny Professor of Health Sciences.

**Publications:** Jamie C. Macbeth, Sandra Grandic, “Crowdsourcing a Parallel Corpus for Conceptual Analysis of Natural Language,” *The 5th AAAI Conference on Human Computation and Crowdsourcing (HCOMP 2017)*, Quebec City, QC, Canada, October 24-26, 2017.

### SRINIVAS SUNDARRAM

**Awards:** Faculty Resource Network Scholar-in-Residence at New York University, Spring 2018.

**Presentations:** S. Sundarram and V. Kakumanu, “Micro Bioreactor Array for Drug Testing Applications”, *ASME IMECE 2017 Conference*, Tampa, FL, November 2017.

**Publications:** S. Sundarram and V. Kakumanu, “Dual Pore Network Polymer Foams for Biomedical Applications via

Combined Solid State Foaming and Additive Manufacturing,” *Materials Letters*, February 2018(213, 366-369).

### DJEDJIGA BELFADEL

**Awards:** Summer Research Stipend 2018, Fairfield University, “Infrared (IR) Space Based Sensor Calibration Using a Single Target of Opportunity.”

Pre-Tenure Leave on “Automatic Calibration for Space Based Sensor Using a Single Target of Opportunity”, Spring 2018.

**Funding:** Senior design team comprised of Kyle Dube, Kerin Nussbaum, Andrew Tavcar, and Michael Wright received Hardiman Scholarship funding of \$2,100 from Fairfield University for their project “Robust Object Tracking with Gaussian Kernel.”

**Publications:** D. Belfadel, Y. Bar-Shalom, and P. Willett. *Space-Based Sensor Bias and Target State Estimation Using a Single Target of Opportunity*. Submitted to *IEEE Tans. on Aerospace and Electronic Systems*, Feb. 2018.

D. Belfadel, and Y. Bar-Shalom. *On-orbit calibration of satellite based imaging sensors*, in *Proc. SPIE Conf. Signal Processing, Sensor/Information Fusion, and Target Recognition XXVI*, #10646-5, To be presented in Orlando, Florida, April 2018.

R. Munden, M. Arambulo Rodriguez, D. Belfadel, M. Zabinski. Assessment of Critical Thinking and Design practices

in *Fundamentals of Engineering*. To be presented at the Annual Conference and Exposition, Salt Lake City, Utah. June 2018.

### UMA BALAJI

**Publications:** Uma Balaji, “Design of a Broadband Finline Filter”, presented at the Long Island Systems, Applications and Technology Conference, Farmingdale, NY, May 2017 and in the conference proceedings on *IEEE Xplore*.

Uma Balaji, “Simulation Models of Energy Cables in SPICE”, *International Journal of Power Electronics and Drives (IJPEDS)*, Accepted for publication.

### ADRIAN RUSU

**Funding:** Ravina Hingorani, Andrew Danick, Joseph Paulin, Davina Phillips, *Aircraft Conflict Resolution Cataloguer*, Hardiman Grant, 09/2016 – 05/2017.

Ryan Toner, *Aircraft Conflict Resolution Cataloguer*, NASA CT Space Travel Grant, 09/2017.

Matthew Richardson, Peter Julian, Nicole Kwasnaza, Brian Walsh, *Air Quality Visualization*, Hardiman Grant, 09/2017 – 05/2018.

*Comparison and Integration of Agile and RTCA DO-178C Software Development Processes*, Sikorsky Aircraft, 09/2016 – 12/2016.

*Data-Driven Dashboard for Commodity Markets*, Saugatuck Energy, 02/2017 – 12/2017.

Visualization of Air Quality and Probabilistic Forecasts, IBM Shared University Research Award, 08/2017 – 08/2018.

**Presentations:** Fairfield Undergraduate Student Conference Presentation – Ryan Toner, *Aircraft Conflict Resolution Cataloguer*. 36th IEEE/AIAA Digital Avionics Systems Conference (DASC 2017), St. Petersburg, FL, September 2017.

**Publications:** Chu Yao, Adrian Rusu, Andrew Danick, Ravina Hingorani, and Ryan Toner, *Aircraft Conflict Resolution Cataloguer*. *Proceedings 36th IEEE/AIAA Digital Avionics Systems Conference*, September 2017.

### AMALIA RUSU

**Awards:** Faculty research sabbatical in Spring 2017, for “Metaphor-Based Serious Computer Games” project.

**Funding:** Engineer-in-Residence program funding through Servo-Robot Corporation, \$180,000 through December 2019 supporting applied AI research projects with faculty, students, and embedded engineers.

### MEHDI SAFARI

**Presentations:** Safari, M. “Local Entropy Generation in Large Eddy Simulation of Turbulent Reacting Flows,” *Proceedings of ASME International Mechanical Engineering Congress and Exposition*, Tampa, FL, November 3-9, 2017.

Safari, M. “High Fidelity Modeling and Simulation of Energy, Combustion and Propulsion Devices, Engineering Colloquium Series,” University of Bridgeport, Bridgeport, CT, September 28, 2017 (Invited).

**Publications:** Sheikhi, M.R.H., Hadi, F. and Safari, M. “Large Eddy Simulation of a Turbulent Mixing Layer Under Supercritical Pressure Condition,” *Bulletin of the American Physical Society*, 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO, November 19-21, 2017.

Safari, M. “Local Entropy Generation in Large Eddy Simulation of Turbulent Reacting Flows,” *Proceedings of ASME International Mechanical Engineering Congress and Exposition*, Tampa, FL, November 3-9, 2017.

### RYAN MUNDEN

**Awards:** Awarded Faculty STEM Education Programming Grant for STEM Outreach through Robotics Service Learning, NASA CT Space Grant Consortium \$2000.

Awarded Partnerships for Social Change Grant for Building a Sustainable Partnership between Fairfield’s School of Engineering and ACCESS Educational Services to Support STEM Outreach efforts through Robotics and Web Development in Bridgeport from the Fairfield University Center for Faith and Public Life \$5500.

**Presentations:** R. Munden, M. Arambulo Rodriguez, D. Belfadel, M. Zabinski. “Assessment of Critical Thinking and Design

practices in *Fundamentals of Engineering*.” 2018 ASEE Annual Conference: Salt Lake City, UT, June 2018 (accepted conference presentation).

R. Munden. “Engagement in Practice: Integration of an Engineering Service Learning Course with a High School Robotics Team.” 2018 ASEE Annual Conference: Salt Lake City, UT, June 2018 (accepted conference presentation).

### CORPORATE PARTNERSHIPS

**Servo-Robot** has renewed its partnership with Fairfield University’s SOE for two more years. A Kawasaki industrial welding robot was recently added to Servo-Robot’s on-campus Artificial Intelligence Lab, where Dr. Amalia Rusu supervises two engineers-in-residence and five student research assistants working on AI/robotics research projects.

**Landsdowne Laboratories** has entered a new partnership with the SOE. Two engineering students, under Dr. Ryan Munden’s supervision, will aid Landsdowne Lab researchers applying nanomaterials in health and safety products.

**IBM’s Weather Underground** division is currently collaborating with Dr. Adrian Rusu and 25 graduate and undergraduate students to develop an app to combat air pollution. See article on page 12 for the full story.

## Engineering the Clean Air App

Adrian Rusu, PhD, School of Engineering professor and department chair of Computer Science, along with two teams of Fairfield University graduate and undergraduate students, has been given a grant from

The Weather Company, an IBM Business, to collaborate on building an app that will combat the pressing environmental issue of air pollution.

“A big challenge in making people aware of the problem is showing the pollution levels in a simple way,” said Kourosh Karimkhany, head of Weather Underground, a division of The Weather Company that provides real-time weather information via the Internet. “We also need to represent air pollution graphically on the web and in mobile apps, which creates a few more challenges – which is something we hope Fairfield students can help us solve.”

Nearly 25 students are involved with the project. Several classes have been divided



step to doing something about it,” said Karimkhany. “Not only should this be something that informs people, it should be something that makes people want to download it, share it with their friends, and keep using it on their

phones. The trick to a good product is that people become passionate about it.”

“I think students are going to bring a very different perspective,” said Robyn Weeks, director of mobile products at The Weather Company. “This is a complete fresh slate — new ideas, new thought processes.”

Nicole Kwasnaza '18, a senior undergraduate studying computer engineering, is looking forward to seeing real-world applications for data visualization and how that data will make an impact on the environment and fellow citizens. “It will be really inspiring to see how we can help other people,” she said. “Maybe we can save lives or prevent diseases using this app.”

into teams that will compete on technical elements and will engage in real-time work in air quality visualization directly with team members at The Weather Company.

“This is what engineering is all about — real world experience – hands-on work to solve real problems,” said Dr. Rusu, who bridged the relationship with The Weather Company last year and is an expert in visualization, having worked previously with the Federal Aviation Administration on next-generation air traffic controls.

“Over the past couple of years, technology has reached a point where you can measure air quality well and once you know what air pollution is like around you, that’s the first

## Engineers Excel at International Baja Buggy Design Competition

Last summer, a group of Fairfield University School of Engineering students crossed the finish line for the first time ever at the Society of Automotive Engineers’ Baja Buggy Competition in Peoria, Illinois.

Held at Caterpillar’s Research and Demonstration Center, the international design competition challenged more than 100 college teams to build a Baja Buggy — a single-seat off-road vehicle designed to operate in dirt, mud, on rocks, and other rough terrain — from scratch, within a strict set of design rules. Four young women and six young men formed the Fairfield University team (Fairfield Stags Racing) for the five-day competition.

“We had to design and build the frame, steering system, brake system, suspension system, and safety systems,” said Emily Yale '18, a mechanical engineering student and co-team captain. “This project really made us understand why it usually takes automotive manufacturers 72 months to take a car from concept to showroom floor; building a car is not easy.”

The competition was divided into two facets — static and dynamic events. The static events consisted of a cost report, a sales report, and a design evaluation. The dynamic events consisted of acceleration, hill climb, rock crawl, maneuverability, and a four-hour endurance test.



**Joseph Maini '18 driving Fairfield's Baja Buggy during the endurance test portion of the competition.**

Joshua Dougherty '19, a Fairfield team member and mechanical engineering major with a minor in mathematics and physics, said the sportsmanship and camaraderie during the race was unlike anything he'd ever experienced before.

“We were overwhelmed by anticipation and excitement. Every team, organizer, advisor, and facilitator greeted us with a smile,” Dougherty said. “No matter who you were —

a first-timer or a 25-time reigning champion — if you stopped by a team’s tent to talk or ask for help you had the team’s full attention and ability at your disposal.”

Professor Bob Wojna, a semi-retired electromechanical engineer and the Baja Buggy team advisor, explained that engaging with the Baja Buggy project allows for the simulation of real-world engineering design projects and indeed helps students to build important connections with peers and engineering companies.

“Our students had interactions with students from colleges and universities from all over the world,” Wojna said. “Also, companies like Caterpillar, Honda, and Polaris, among others, attended the race to scout and recruit potential employees.”

When it was time to compete, although not a prizewinner, Fairfield’s Baja Buggy held its own against others in the race. “Our design performed to our expectations and did well against other first-year teams,” Yale said. “We learned a lot about design optimization while talking to the other teams at the competition and we have a lot of new ideas for this upcoming year.”

Those new ideas are being put into practice now, as Fairfield’s Baja Buggy design team races to complete a new and improved vehicle in time for upcoming summer competitions.



# Engineering Student Accomplishments

## NASA CT Space Grant Awardees, Fall 2017:

**Ryan Avery** – Community College Transfer Scholarship - \$5k

**Samuel Nguyen** – Undergraduate Scholarship - \$5k

**Christina Ficaro** – Student Project Grant “Portable Solar Powered Desalination Unit” - \$1k

**Thomas Moraski** – Student Project Grant “Precision Adhesive Application” - \$1k

**Ryan Toner** – Student Travel Grant to Digital Avionics Systems Conference, St. Petersburg, FL - \$888

## 2017 Leslie Hoffman Scholarship:

**Johnathan Menz '18** - \$20k

## American Society of Heating, Refrigeration and Air-Conditioning Engineering (ASHRAE) 2017 Bi-State Chapter Scholarship:

**Johnathan Menz '18** -- \$1K

## 2017-18 Inductees to Tau Beta Phi, Fairfield's Engineering Honor Society

**Class of 2018:** Philip Amarante (CE), Michael Foster (ME), Kathryn Higgins (BE), Samuel Klippel (ME), Johnathan Menz (ME), Russell Moore (EE), Samuel Nguyen (CS), Joseph Taggart (ME), Carlos Urena (SW).

**Class of 2019:** Mckenzie Armington (ME), Ryan Avery (EE), Gabriella Borea (ME), Davis Doherty (SE), Michael Lynders (EE), Kaitlyn Nelson (ME), Maverick Ruiz (EE), Bryan Sepkowski (EE).

## 2017-18 Scholarship Recipients

The funds for these scholarships were provided by the SOE, John G. Phelan, Alexis Zaveruha, and Bernadette and John Porter.

Lakshmi Dheeraja Damerla	Tejaswini Moparthi
Jerome Davis	Jacob Musto
Evan Evans	Prachi Oke
John Finazzo	Ranjana Kamalakar Patankar
Sandra Grandic	Bindu Madhavi Pesaladinne
Balfour Harris	Son Pham
Ravina Hingorani	David Ridgeway
Wei Hu	John Sawicki
Jung Soo Kim	Christopher Suter
Mikolaj Kulis	Adam Szirtes
Harold Corey Loke	Calvin Thomas
Luis Lopez	Shaamil Vyas
Carlos Mesquita	
William Milkovic	

## First-Year SOE Student Presents Peer-Reviewed Paper at Major International Conference



Ryan Toner '21 and Adrian Rusu, PhD, chair of the Computer Science and Engineering Department, attended the Digital Avionics Systems Conference (DACs) last fall, where Toner presented the peer-reviewed paper he co-authored, “Aircraft Conflict Resolution Cataloguer.”

This paper was the culmination

of a year-long CRDA, or Collaborative Research and Development Agreement, in which the FAA assigned a team of Fairfield students the task of devising an algorithm to categorize maneuvers taken by aircraft to avoid conflicts. “Hopefully, our work will either be utilized by the FAA to supplement their existing technology, or will be incorporated into a larger part of their NextGen system,” said Toner.

# “We won’t have a society if we destroy the environment.” – Margaret Mead

More than 140 students from local middle schools and high schools attended the SOE’s Engineers Week event last winter at the Maritime Aquarium in Norwalk, Connecticut. The day of activities was the final community event in a weeklong series that Fairfield programmed for Discover E’s annual Engineers Week — which celebrates how engineers make a difference in our world, increases public dialogue about the need for engineers, and brings engineering to life for kids.

Fairfield engineering undergrads organized a full day of programming at the aquarium, which began with an IMAX® theatre screening of Discover E’s engineering documentary Dream Big. After the film, students toured the aquarium and participated in hands-on engineering workshops.

Kacper Laska '18, a mechanical engineering major and co-president of Fairfield’s Engineers Without Borders chapter, described the workshops as a beneficial experience that allowed Fairfield students to share with the community how engineering impacts our world. “It’s a whole different atmosphere,” he said. “The kids were really engaged. Teaching them about the water filtration system we built in Bolivia was a great experience for everybody.”

Assistant Dean Marcia Arambulo Rodriguez MOT’15 helped put the Maritime Aquarium event together as a way to involve the community in engineering education, and to encourage young people to enter into STEM careers. “We are always on the lookout for more engineers and new ways to inspire kids to become engineers or scientists.”

## Fairfield’s Antonio Tello '18 Named NACME Undergraduate Research Fellow For Green Tech



Antonio Tello '18

The National Action Council for Minorities in Engineering (NACME) has awarded Fairfield University student Antonio Tello '18 a \$5,000.00 grant for his Green Technology research project, “Feasibility of Solar Recharged Electric Bike Share Program for Fairfield, CT.”

Working under the guidance of Ryan Munden, PhD, associate dean in the School of Engineering, Tello’s project will determine the viability of bringing this innovatively green and undeniably hip transportation alternative to the Fairfield community. “If feasible,” says Tello, “implementation would foster lower carbon transportation, as well as increase economic benefits.”



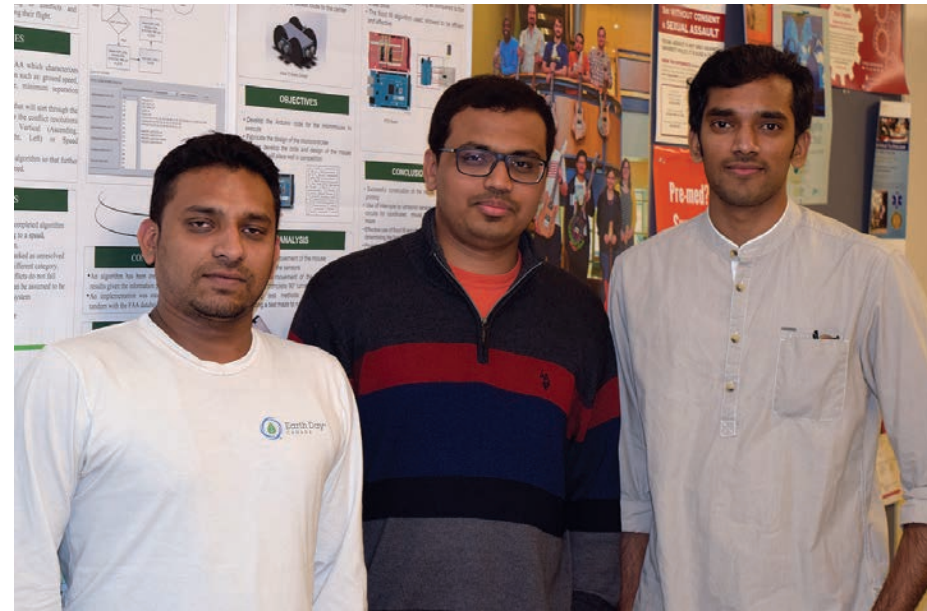
## Team Places Second in Statewide Coding Competition

Sponsored by the Connecticut Technology Council (CTC), two separate competitions – one for coding and one for engineering – pitted teams of highly skilled student engineers from colleges and universities across the state against one another in the second annual College Tech Challenge.

Two teams of Fairfield graduate students made it through an on-campus qualifying round and were selected to compete in the CTC's final competitions last fall in Bristol, Conn.

Team StagPower, formed by software engineering students Xin Ning and Daniel Vasconez, won second place in the final coding challenge with an "Aging in Connecticut" web application built to be uniquely navigable for senior citizens. According to Ning, their prizewinning website concept was designed to provide the state's elderly population with relevant and accessible information for their daily activities.

Lalith Kumar Sonnakula, Sosender Madas,



Fairfield School of Engineering grad students (l-r): Sajiv Francis, Sosender Madas, and Lalith Kumar Sonnakula

and Sajiv Francis were members of Fairfield's second group of participants, Team Static, which held the distinction of being the only team invited to participate in the final rounds of both the coding and the engineering challenges – no easy task, as the two challenges occurred simultaneously within a strict time constraint.

According to mechanical engineering student Sosender Madas, for the final engineering challenge, "we were tasked to develop a technology solution to reduce waste in the farm-to-table supply chain, focusing on the urban environment." All

team members agreed that it was motivating to focus their broad industrial knowledge toward a solution to a specific real-world issue.

"The College Tech Challenge allowed us to understand the varied needs of our society," said Sajiv Francis, "and this challenged us to explore new datasets to build useful solutions."

Not only did the College Tech Challenge serve as a collaborative venue for technology students, it also showcased to local technology firms the high

level of engineering talent being cultivated in Connecticut's colleges and universities. Associates from local companies served as judges for the competition, and the event also featured a hiring fair with representatives from over 40 tech and tech-enabled Connecticut companies.

As Sajiv Francis put it, "People want new ideas. It helps companies to see how engineering students think and what they are thinking. To succeed in engineering, we must be the innovators."

## Creativity Rocks...

...in this popular **STEM of Guitar** class where Fairfield engineering students use STEM concepts to design, manufacture, and assemble their own solid-body electric guitars.

The course covers wood species and the environment, guitar headstock design features, chemistry of finishes, math applications in a guitar, and physical science components such as mechanical systems, concepts of sound waves, string tension, fretboard layout, intonation, and electronics.

"This is a colorful and creative way to learn," Dominic Figueiredo, SOE machine instructor enthused. "And you leave with your own guitar, which is just awesome!"





**Fairfield**  
UNIVERSITY  
School of Engineering

## VISION

As an integral component of a comprehensive Jesuit university, the **Fairfield University School of Engineering** is committed to providing a student-oriented classroom and laboratory environment enhanced by research that enables graduates to become leaders in the quest to solve society's greatest challenges in service to others.

## MISSION

The **Fairfield University School of Engineering** is dedicated to providing quality educational opportunities in engineering and computer science to a diverse student population. The School emphasizes whole-person development (*cura personalis*) through its commitment to a unique integration of expertise in innovative technical areas with a strong liberal arts core preparing graduates well for professional practice and graduate education.