SPRING/SUMMER 2016

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MECHANICAL & AEROSPACE ENGINEERING

WHERE ENGINEERING HAPPENS:

Student Design Center Provides Space for Engineers to Get Hands-On Experience

GREAT ENGINEERING IS A CROSS BETWEEN STRONG FUNDAMENTAL KNOWLEDGE AND STRONG PRACTICAL APPLICATION.

The MAE Student Design Center is never a quiet place — it's a building that bustles with the sound of machinery and ambition.

TATIANA LUNA, MAE student and a member of the AIAA Rocket Team, worked in the Design Center in Spring 2016 as the testing lead.

While cutting a wooden platform for their CO_2 ejection system, she took in the new-shop smell. It is hard to miss the energy of the other teams working around her, talking through problems, strategizing and discussing solutions.

"When everyone in the shop is working on their projects, it motivates you even further to ensure whatever you produce is a quality item," Luna said.

It was her first time working in a shared space rather than a location devoted to one team or class, and she loved the surroundings.

"I was amazed by the facility," she said. "It was so grand and had a shiny look to it. And everyone in there has a goal and is working hard to achieve it. It's a great atmosphere to be in."

The Center is tucked in a corner of the UF Energy Research and Education Park, and it houses a 3,600 square-foot, warehouse-like space where students' dreams have room to become a reality.

MAE student **WILL WALKER,** a member of Design/Build/Fly, agrees that the Center can have an exciting atmosphere.

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INSIDE

UF UNIVERSITY of FLORIDA

LETTER FROM THE CHAIR

David W. Hahn

I want to welcome all students, alumni, faculty, staff and friends to the MAE Spring/Summer newsletter; I hope that you enjoy reading about all the exciting things happening in the department. I write this letter following the Spring Commencement, where we are preparing to graduate nearly **600 GATOR ENGINEERS** (BS, MS and PhD) from MAE!

It is a special time of the year as I reflect on all the faculty and staff members, as well as the students who have come before them, who have helped shape this next generation of young engineers. I am confident they will move forward with their careers grounded in technical excellence along with a strong sense of ethics and social responsibility as they prepare to help tackle our societal needs. I believe that we are, indeed, in good hands.

I would like to focus on the preparation of these graduates. As mechanical and aerospace engineers, their career paths will take them in many directions, but at their core will always remain the innate ability to analyze, create and design. To hone such skills requires engineering fundamentals coupled with significant hands-on learning, as it is essential for young engineers to explore, and sometimes fail, in a safe learning environment. It was to help achieve this goal that we invested heavily in our laboratory courses; however, labs alone are only part of the solution. We believe the rest of the solution is to be found in rigorous **DESIGN & BUILD** experiences. Toward this end, I am most proud to announce the opening of our new **MAE STUDENT DESIGN CENTER!**

The Design Center is the completion of a nearly four-year journey made possible by the efforts of many and the generous support of friends and alumni. As you will read, this state-of-the-art facility provides the hands-on learning environment in which our many design and build teams will have the resources to excel as Gator engineers. My vision is that the Center will become a hive of student activity and collaboration for years to come.

To ensure the center remains well resourced, MAE alumnus **WILLIAM GAY** (BS, 1949) and his wife established the **WILLIAM AND ELOISE GAY DESIGN CENTER ENDOWMENT** with a most generous founding donation of $250,000. Our goal is to grow this endowment to $1 million through the generosity of our many MAE alumni and friends. I have the privilege of meeting many alumni of MAE, and I have yet to meet one that does not place a high value on their hands-on experiences during their education. As you contemplate your philanthropic goals, please know that our dedicated faculty and staff members have an unwavering commitment to engineering excellence. Our infographic on the back cover details how your support benefits our many students and faculty members. Together, I am confident that we will reach our vision and ensure that future generations of Gator engineers will flourish both in and out of the classroom.

While I have focused on the design and build experience, with this issue you will read about the many achievements of our students, faculty and alumni. I am proud to say that the Department is in excellent shape and is clearly on the ascent as we continue to lead the campus, the state and the nation in so many important measures. It is a great time to be a Gator Engineer.

WHERE ENGINEERING HAPPENS

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"I don't know if you can picture it," he said, "but on a Friday or Saturday night, this place is buzzing — full of us working through our weekends."

The Center is capable of housing up to 100 students, so instead of groups operating in isolation, teams can work under the same roof and help each other solve engineering challenges by pooling knowledge and providing fresh heads for solutions.

ASME Human Powered Vehicle Challenge, UF Formula SAE, the Society of Women Engineers and Solar Gators are also set up at the Center, and other student organizations with design needs can use the space if they need it.

MAE student **ELISE DUTREIL,** a member of SWE, said that the group used the Center to work on their first Rube Goldberg design contest entry in years.

"The Design Center has really helped SWE get young engineers of all majors interested in design and manufacturing," Dutreil said. "It's also a fun way to meet other students, be creative and get hands-on experience."

MAE Department Chair **DAVID HAHN** said previously the department had its design clubs operating scattershot across UF's campus; He made it his top priority to bring the teams together into a common state-of-the-art workspace.

While the proximity to classes may have been more convenient, the working spaces were not. The spaces were older, and in the case of Design/Build/Fly, in disarray.

"We've gone completely to the other end of the spectrum," Hahn said.

Hahn's inspiration for the new design center came from his travels around the country when he got a glimpse of other universities' facilities. Though he said UF has one of the best programs, he saw this as an area where the school could improve.

"If you want to play with the elite schools, you have to have something like this," he said.

Funding for the project comes in part from alumni, as well as an endowment founded by William and Eloise Gay. Hahn said he ultimately wants to grow the fund to upwards of $1 million. This will fund the Center's ongoing activity in perpetuity.

"The design center is a key component of our commitment to experiential learning," Hahn said. "It's essential to supplement formal classroom learning with hands-on engineering — an essential part of creating the next generation of engineers."

ALEXANDER SCHNEIDER, a recent UF alumnus who was Design/Build/Fly's lead designer on the project, echoed these sentiments.

"I definitely agree that hands-on work is the only way other than an internship that you're going to get experience for the real world in a college setting," he said.

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HOW YOU CAN HELP

The Student Design Center provides MAE students a safe environment to pursue their engineering passion, to learn critical skills such as teamwork and time management, and most importantly to become Gator Engineers. Your generous contribution will provide the Center with the necessary supplies, tools and equipment, and travel support to ensure the success of our students.

The Student Design Center was endowed with a founding gift of $250,000 from the William W. and Eloise D. Gay Foundation. With your help our goal is to grow the endowment to $1M. Please consider the Center with your future giving.

FACULTY

UF Mechanical and Aerospace Engineering Leads Way in Bioengineering Tec

Prof. **TOMMY ANGELINI** and Prof. **GREG SAWYER** just disrupted the field of 3D printing with a jellyfish.

Prior to Angelini's discovery, a 3D printed, soft-matter jellyfish was a pipe dream. There was no prior method for creating something so complex with soft matter printing. Traditional 3D printing methods rely on using liquids, or ink, to print layer by layer. We see this done with plastics and metals — both solids.

However, if one were to try printing something so complex as a jellyfish with matter as soft as, say, human tissue, it gets more complicated. How does soft matter — matter that Angelini describes as being unable to support its own weight — support itself during that printing process?

The solution for the problem is called Carbopol.

Carbopol is the gel commonly used in hand sanitizer and is 99.8 percent water. The other 0.2 percent is a solid polymer. What this means is Carbopol is just solid enough to create support around soft matter during the printing process but also easily falls away while printing.

Angelini explains it this way: The bubbles you see trapped in hand sanitizer show that despite Carbopol's liquid-like nature, the substance is really a solid.

"These gels really do trick you into thinking they're liquids," Sawyer said. "Unless you really have a deep understanding of the physics like Tommy does, you might overlook them. He recognized immediately what it was. It's a solid. It's a solid that's so weak it yields under its own stresses."

The results of this printing method have been phenomenal. When Sawyer saw the early results of structures coming out of Angelini's lab, he urged his colleague to go further: make the jellyfish.

The jellyfish is just one example. A 3D printed knot, tied over on itself, is another example of the forms made possible through this printing method.

However, Angelini's interest was never in finding a soft matter 3D printing solution. The 3D printer he developed was just a means to an end.

Angelini and Sawyer's work allows them to print anything they want, but what they really want is the development of a 3D "petri dish" that resembled human tissue for the study of cell behavior in three-dimensional space. Sawyer had a more blunt, ambitious way of putting it.

"We're interested in curing cancer," he said.

So instead of printing jellyfish, they'll be printing constructs similar to the human body, printing tumors and sections that mimic organs, then placing living cells inside to be able to better understand how they behave.

For example, by printing a tumor, researchers could 3D-print a patient's unique tumor out as many times as they need to try a variety of different treatments to find which one works best for the individual patient.

"The future of cancer diagnosis, treatment and management will use 3D tumor arrays," Sawyer said. "What we're working on now establishes the engineering and scientific foundation, along with the conceptual framework necessary to bring this vision to biomedicine within the next decade."

Angelini wanted to break it down even further, saying he just wants to create simple structures to study the cell behaviors not within any simple space but at the most fundamental levels.

"It's hard to study a real tissue and understand how it gets its properties," he said. "When you can make very simple, controlled structures, you can gain the most insight."

Down the hall, UF professor **YONG HUANG** is working on a 3D printing project of his own with NSF funding.

Huang's research also deals with bioengineering. However, instead of working on cancer research, he is working on developing printing technologies capable of creating vascular constructs using living cells.

Most recently, his lab churned out a series of 3D Y-shaped cellular constructs printed using bioink, or printing ink that contains living cells.

"Over my time as a professor, I have come to see where we could make more impact — to have a higher societal impact when tackling various challenges," he said. "One challenge is related to how we approach health care. We saw how our manufacturing expertise could improve the quality of health care."

Huang's goal is lofty: He's trying to create printing technologies that would one day pave the way for printing living organs.

Anyone expecting a 3D-printed heart tomorrow will be in for a long wait. He estimates the arrival date of the necessary technologies anywhere from 20 or more years from now. He puts the date far off in the future, but he said he is optimistic that with the efforts of engineers, biologists and others in the medical field, it could be realized.

Before organ printing could even become a possibility, veins and arteries must come first, and Huang's Y-shaped cellular construct creation using living cells is an important first step in this direction.

He said he chose the Y-shaped constructs because it is a challenge to freeform fabricate such complicated, heterogeneous constructs. Using a combination of inkjet direct-write technology, extrusion and/or laser printing — not to be confused with similarly named home-printing technologies — to create various 3D heterogeneous constructs is still full of scientific challenges.

Huang, like Sawyer and Angelini, said he was proud engineers could be making progress in the medical field.

MAE Chair **DAVID HAHN** takes these sentiments even further, believing soft matter engineering's potential is boundless. "I am convinced that MAE will lead the nation in this emerging area."

WHERE ENGINEERING HAPPENS

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Schneider would know. Before setting foot in a UF classroom, he worked three years as an aircraft mechanic. He said his experience always helped him visualize practical applications for what he was getting from the classroom.

"You learn the book work. You learn the theory," he said, "but you don't get to test the theory in every class."

He said his hands-on experience as well as his work in design clubs helped him when it came time to start looking for jobs.

As all the other professors would say, it's the opportunity to fail that the Student Design Center provides. And in that aim, it succeeds.

The success so far is because of the gracious donors who contributed to the cause — who knew that providing students with a resource for hands-on learning is critical to setting up the best learning environment for our future mechanical and aerospace engineers.

"Everyone in there has a goal and is working hard to achieve it. It's a great atmosphere to be in."

— TATIANA LUNA

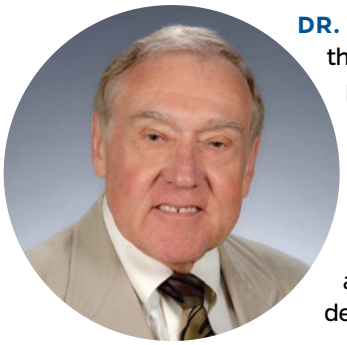
The Design Center's major benefactors are:

- William J. Bierbower
- William and Eloise Gay
- Frank and Jane Gillette
- Hjalma and Laura Johnson in Honor of Professor Thomas Neff
- Charles and Peggy Myers
- John and Judi O'Steen
- Curtis Stanton

If you're interested in learning more about the Center or helping the MAE Department meet its fundraising goal, please contact David Hahn directly at at dwhahn@ufl.edu or 352-392-0807.

PROFILE:
Dr. Winfred M. Phillips

"Be creative and chase your dreams. Engineering enables the quality of life for humankind."



DR. WINFRED M. PHILLIPS is the author of over 180 research publications that focus on mechanical engineering, fluid mechanics and biomedical engineering. He's also proud to be a member of the University of Florida faculty, where he is a tenured member of the MAE department.

"UF is a great university — one of the most comprehensive anywhere," he said. "There are outstanding students pursuing a broad diversity of goals, interacting with a first-quality faculty and creating a vibrant and exciting community of scholars."

Phillips' research in biomedical engineering concentrated on the development of an artificial heart for mankind. At Penn State, he was part of a team that created the first surgically implantable heart pump to be used in a clinical setting, he said.

"Engineering has a great deal to contribute to human health and well-being, and I am proud to participate in that," he said.

But according to Phillips, the accomplishment he's most proud of at UF is working with department chairs in engineering to hire outstanding faculty and bring the UF engineering college to ever-increasing prominence.

Phillips started at UF as Dean of Engineering in August of 1988. Since then, he has held various positions, including Vice President for Research and Senior Vice President and Chief Operating Officer. Currently, Phillips is UF's Executive Chief of Staff and a professor of both mechanical and biomedical engineering.

According to Phillips, one of his lasting legacies as a member of the University of Florida administration are his efforts in creating 500,000 square feet of new research space, allowing faculty and students to pursue their dreams and enabling UF to move up in the rank of truly outstanding universities.

That 500,000 square feet of space is broken up across the Biomedical Sciences Building, Cancer and Genetics Research Building, Emerging Pathogens Institute, Nanoscale Research Facility, New Engineering Building and Particle Science Building.

His favorite part about working at UF is the creative academic environment encompassing all fields of study and career opportunity.

"With planning, patience and persistence, the opportunities for and at UF are without bound," Phillips said.

CONGRATULATIONS TO:

DR. HITOMI YAMAGUCHI GREENSLET for being selected as an ASME Fellow and being elected a Fellow of SME.

DR. CURTIS TAYLOR, who was recently promoted to Associate Dean for Undergraduate Affairs. Taylor oversees the nanomechanics and soft matter manufacturing lab and teaches courses in nanomechanics. He is previously a winner of the 2011 ASEE Southeast Region New Faculty Research Award, and in 2007, while at Virginia Commonwealth, he was nominated for the Outstanding Teacher Award for the State of Virginia.

DR. WARREN DIXON, who was recently named a Fellow of both ASME and IEEE for his contributions to adaptive control of uncertain nonlinear systems.

PEER ADVISORS MAKE THEIR MARK ON THE DEPARTMENT

PAUL ROCHA may have graduated with his degree in history, but his college friends helped him find his true place in engineering. As an undergraduate, he spent time with friends in the engineering department who showed him the impact engineering can make.

This appreciation for engineering brought Rocha to MAE in 2014, when he joined as an undergraduate advisor. He was instrumental in the launch of a new initiative: the peer advising program. Based on a similar program in the chemical engineering department, Rocha said one early challenge was scaling the effort to meet the needs of the MAE department's 1,600 undergraduate students.

"I didn't always support peer advisors," Rocha said, having seen programs like this flop. However, just one year after launch, he considers this program hugely successful.

Each peer advisor serves a few hours per week, offering advice on involvement opportunities and sharing their thoughts and experiences for the curriculum.

Peer advisors often see up to 70 students a day early on in the semester, and the advisors have seen the benefit of this attention. Here is what a few of the peer advisors had to say:

"It is now easier and faster to find the answers to common questions that many, if not all, students will encounter at some point."

— Bradley Wallace

"Speaking with students who have just gone through the same process themselves is a lot more relatable, as well as far less intimidating for most undergraduates."

— Nicola Imponenti

"I like to think that I am making a positive impact in the undergraduate careers of the students that visit my office hours."

— Matthew DeVries

"I wanted to get involved because I wish someone would have been there to help me when I was an underclassman."

— Nikki Weiss

ROCHA

EHLERS

As successful as it is, Rocha isn't settling. He continues to strive to make the program more convenient for students by enlisting additional advisors to expand their hours or by establishing new offices in different buildings to better be where students need them.

While Rocha continues to expand the peer advising program at the undergraduate level, **KAREN EHLERS** is working to introduce a similar program for graduate students in the department.

Like Rocha, she doesn't have a background in engineering; however, she does know what it means to impact education — she's been at UF for almost 20 years, working in various roles. With her Doctor of Education, Ehlers was hired by MAE Chair **DAVID HAHN** to help professionalize the advising of MAE's PhD students.

Her dedication to higher education meant she brought plenty of new goals to the department last year, including the launch of a peer advising team for graduate students. The students currently involved through the MAE Graduate Student Council are really excited about its potential.

"The MS Mentoring Program is designed to help new master's students adjust to graduate school life and have a point of contact in making that transition," said **SHAUN DESOUZA,** the chairman of the GSC. "It allows someone in a new city to feel connected to the university, the department and their colleagues."

"The mentors have a different conversation with the students," Ehlers said. "They're an added layer of information for those in the graduate program."

This new initiative is still ramping up, but as Ehlers said, they're on a roll to do for the graduate program what the peer advisors have started to do at the undergraduate level: make a difference.

ENGINEER NAMED **TOP LEADER OF HIS GRADUATING CLASS,** THANKS MAE

PHOTO COURTESY OF DAVID TRONER

David Troner (far right) with an Excalibur tandem two-seat aircraft he and his student organization, AeroGators, were building.

At Fall 2015 graduation, MAE senior **DAVID TRONER** didn't sit with his fellow engineers during graduation.

Instead, he sat on the stage — staring at the entire graduating class of Fall 2015 — as the Outstanding Student Leader.

Prof. David Whitney, the engineering college's first entrepreneur in residence, wrote an essay nominating Troner. Then the selection committee reviewed the 23-year-old's qualifications, including many leadership positions within the engineering department.

"The Mechanical and Aerospace Engineering Department has provided some incredible opportunities that really made my college experience," Troner said.

As it turns out, the Northrop Grumman Corporation agreed with UF that Troner was a catch; he's now on a team in charge of navigation controls for the company's flight control and auto-pilot systems.

"It's all because of UF," said Troner, who graduated Summa Cum Laude.

When he was a freshman, he noticed there was no club for students to build airplanes. So what do leaders do?

Nearly half a decade after he started the aircraft-construction group, AeroGators, he's happy to see his legacy live on.

"I think the best part was seeing them be able to continue on and do things I could never do," Troner said.

He said it taught him not only how to build a plane but also how to build a team.

"It was really cool for me to be able to add something to the MAE department and be able to add something I think people would enjoy," he said.

He and other American Institute of Aeronautics and Astronautics members taught aerospace principles to some of Gainesville's middle school students.

"It's neat being able to share what I love, aerospace engineering, with younger kids and get them passionate as well," he said.

He was able to help not just teens, but his fellow students, as he learned not just scientific principles but how to navigate UF itself.

And he was happy to filter the lessons down to the underclassmen when the department started peer-mentoring: "You go through all these experiences and you gain all this knowledge about the best way to be successful, so why not be able to share it?"

Since he was an underclassman, Troner was plugged into what was happening at the engineering college.

When his mentor Whitney and Prof. Erik Sander helped start the Engineering Leadership Institute and Engineering Innovation Institute, Troner was interested. Sander would later nominate Troner his junior year for the college-wide Attributes of a Gator Engineer Leadership honor.

"I think it was really great that the college started those up to help engineers get those soft skills: ethics, entrepreneurship, creativity," Troner said. "It was a pretty bold thing the college did."

Because of his innate skills, Whitney chose Troner to sit on the committee that picked the leadership institute's first director — Franklin L. "Buster" Hagenbeck, a retired United States Army Lieutenant General.

Troner helped put on the group's annual summit, which features Gator grads who are now industry heads doling out advice and life lessons.

"They'd come in and basically share their experience about how to be successful in business," he said. "It was just a really great experience to interact with these industry leaders."

He is appreciative Whitney let him get in on the ground-floor of such a booming program.

"It's grown so much," he said. "I have to hand it to the people working at the administration; they really have made it grow at UF."

Maybe mingling with the UF engineering alumni comes easy to Troner because he's lived with one his whole life.

His father is a double Gator: electrical engineering from 1976 to 1980 and law school from 1982 to 1984.

"Ever since I was small, there was little sway of me going anywhere else," said Troner, originally from Indialantic near Melbourne on the state's east coast.

He said he appreciates that the comradery of Gator Nation isn't just for sports.

"UF is filled with tons of driven, smart students, so being around people who are so passionate about what they're doing makes the UF experience," Troner said.

Although moving to the West Coast and starting his career has felt like a whirlwind, he knows one thing.

"I attribute just about everything to UF and particularly the college and department."

"UF is filled with tons of driven, smart students, so being around people who are so passionate about what they're doing makes the UF experience."

CONGRATULATIONS TO:

NATHAN DEKREY and his team for being selected as a finalist in the Disney 2016 Imagineering Imaginations competition. Their project, "Extravagizmo! Mickey's Inventor Showcase," was one of six finalists selected for presentation at Imagineering's main campus in Glendale, CA.

SAHADEO RAMJATAN for being accepted to attend the 66th Lindau Nobel Laureate Meeting. Ramjatan is one of 402 young scientists across 80 nations selected to attend.

DANIEL FRANK, who is the recipient of the 2016 Extraordinary Student Volunteer Award. He was recognized at the University of Florida Impact Awards Recognition Dinner in April.

TAPOMOY BHATTACHARJEE, CASEY BARNARD, GUILLERMO GIANNATTASIO and **SABAH PIRANI,** all of whom were recipients of the Attributes of a Gator Engineer Award. They were given awards for Creativity, Leadership, Integrity and Service to the Global Community respectively.

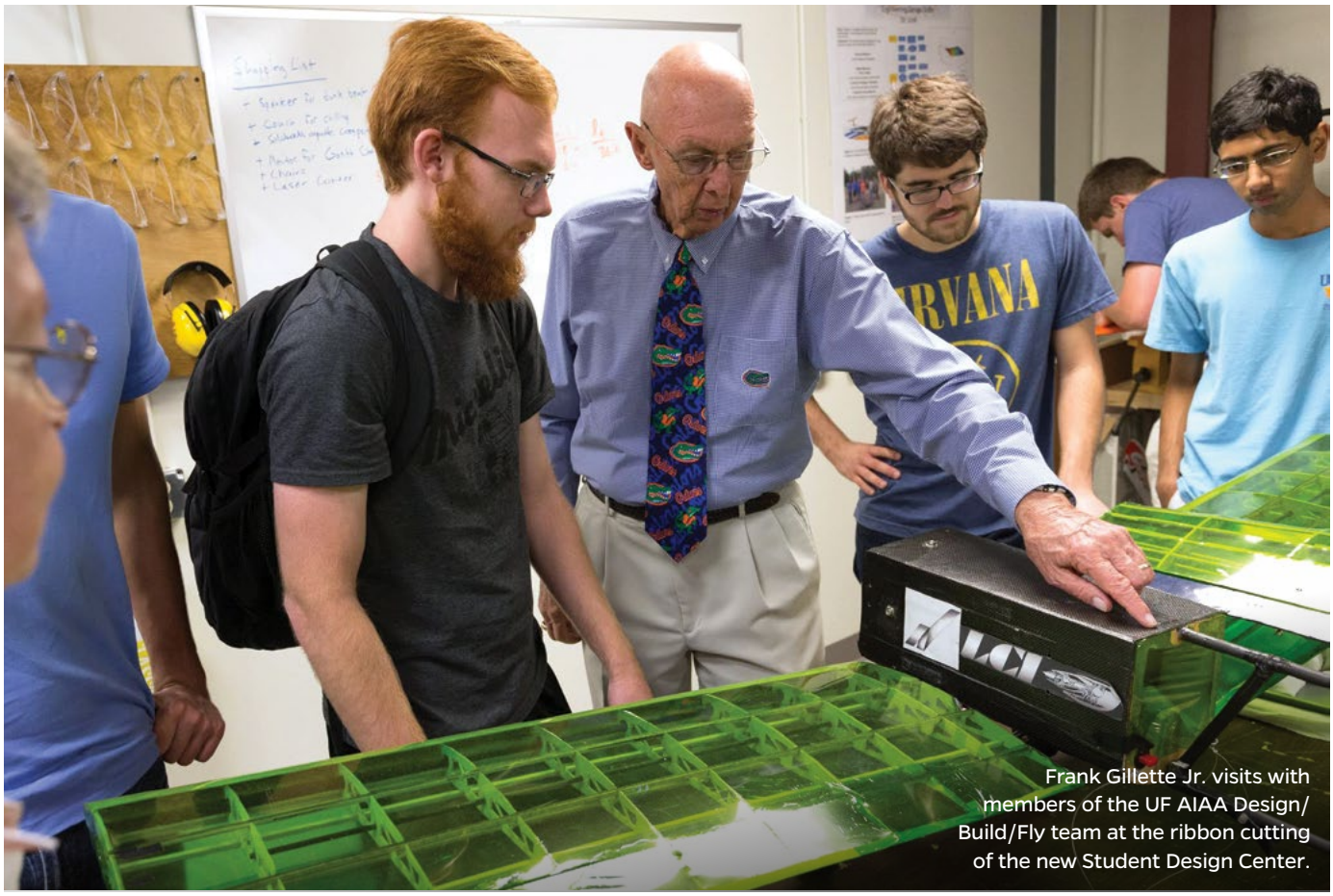
CHRISTIAN COUSIN, MATTHEW WILLIAM DEVRIES, BRETT RYAN FREIDKES, DANIEL HILLSBERRY and **DAVID ZWICK** who were awarded 2016 NSF Graduate Fellowships.

PATRICK KELLY, who earned an internship opportunity with the Air Force Research Laboratory at Kirtland Air Force Base in Albuquerque, NM. He will participate in the Space Scholars Program supporting the Multi-Agent Robot Collaboration.

ALUMNI

PROPELLED TO GIVE BACK:

RENOWNED ROCKET SCIENTIST DEVOTES LIFE TO BETTERING ENGINEERING THROUGH EDUCATION



Frank Gillette Jr. visits with members of the UF AIAA Design/ Build/Fly team at the ribbon cutting of the new Student Design Center.

FRANK GILLETTE JR. (BS, 1962) is all about giving back.

It's why, at the age of 79, some 18 years following his retirement, he is still a consultant at the engineering firm Pratt & Whitney, where he served as an award-winning director and chief engineer and designed engines used in fighter jets worldwide.

It's why he is a volunteer professor at the Air Force Academy, traveling as many as three times a semester back and forth between his home in Palm Beach Gardens, Florida, to Colorado Springs, Colorado, to teach a propulsion course.

And it's why he felt compelled to donate to the creation of the MAE Student Design Center for engineering students at UF.

Overcoming Challenges

Gillette is no stranger to failures and setbacks, to challenges and obstacles.

As a member of the Navy reserves, which he joined in 1955, Gillette had his eye on being a pilot.

However, he was grounded when he found out there was a slight hiccup in his plan: dyslexia, which caused him to mix up the runway numbers during tests.

Though his seven years in the Navy were spent on the ground — and periodically on the ocean — Gillette was not deterred.

Being deterred isn't in his vocabulary.

For example, when asked about his favorite project, he described a development program of an engine, where

repeated fractures in one of the engine's parts caused engine failure. Some might say this was a frustrating project. Gillette called this his favorite.

He quickly dove into the world of fracture mechanics, going so far as to enroll in a course on it. He relished the learning experience.

"Part of engineering is learning failure," he said.

Gillette said he sees modern engineers strong in fundamentals but lacking in the opportunity to overcome problems with their own designs.

"Everybody's worried about their GPA," he said. Pointing to how recruiters increasingly ask new job applicants for their grade-point average, causing the engineering environment to become risk-averse. "Nobody's asking why does this fundamentally work and how does it work?"

It's not to say he isn't bullish on today's crop of engineers. He believes they're armed with a host of tools that make them better overall, especially those he teaches at the Air Force Academy.

"We've got some of the brightest of the brightest there," he said. "They're just big sponges, asking 'Why? Why? Why? Why?'"

Today's engineers, he said, are strong in analysis of existing designs, but he said the nation needs more designers. When he says designers, he means those who have a vision for their own ideas and take those ideas from a seed in their minds to a manufacturing reality.

With the new Design Center, he hopes students will be able to get hands-on experiences with hardware design, learning how things fit together and how those things can be improved upon for assembly and manufacturing.

"Frank truly understands the importance of hands-on engineering, from the technical point of reinforcing the classroom learning, to the teamwork aspects of project management and working with others," said MAE Department Chair **DAVID HAHN.**

Humble Beginnings

Before Gillette was to become one of the nation's premier jet engine architects, he was a student studying agricultural architecture, echoing his roots in Orlando, Florida, where the economy was about citrus.

Gillette was a high school student armed with skill for mechanical drafting. He was an award-winning designer in high school, winning blue ribbons at the county fair for his design work while he attended Boone High School in Orlando, Florida.

"I didn't think I'd ever be an engineer," he said.

Though he had a cushy drafting job in high school earning $3 per hour working on air conditioning for commercial buildings — enough to afford his own car and gas to fill it with — those around him urged him to go to college.

First, he visited Georgia Tech in Atlanta. However, on his way back down to Orlando, he stopped in Gainesville to visit UF. UF, he found, offered tuition at a fraction of the cost and had the added benefit of being closer to home. He enrolled in 1959 after attending Orlando Junior College.

"Not only was it closer to home," he said, "it felt like home."

The year 1957 brought about an event that would alter the course of human history: the Soviet launch of the Sputnik satellite.

Sputnik I didn't just spark a space race between two global superpowers, it pushed a young Gillette toward a career in rocket science. Beginning the journey that would take him from the orange groves of Orlando to father of the F119 jet engine.

The Blessing in Disguise

Gillette calls his dyslexia a blessing.

During his time at UF and following his move south down U.S. 441 to Pratt and Whitney, Gillette credits his dyslexia with improving the quality of his engineering. It always made him cautious. It always challenged him to double-check everything he did and gave him an eye for detail and seeing things in ways he says he couldn't otherwise.

That penchant for detail, combined with his UF education and maybe just a little luck, helped springboard him into a 36-year career spent working on a series of rocket and jet engines.

"I always got the best jobs," Gillette said.

In 1963, he had a hand in developing the RL10 engine's thrust chamber. The RL10 is an upper-stage rocket booster that carries satellites — for purposes ranging from GPS to surveillance — into space to this day.

More notably, he designed the combustor and turbine modules in the F100 engine. The F100 powers every F-15 Eagle and most F-16 Falcons, and both jets remain active in service around the world. In fact, the F-16 is the second most common aircraft in the world.

In the same timeframe, Frank also designed engine components for the J58, the engine that powered the SR-71 Blackbird, the fastest high-altitude reconnaissance aircraft in the world. He also contributed to the design of the space shuttle's main engine.

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ALUMNI

RACING TO THE TOP:

UF ALUM TALKS SAE, SUCCESS AND LEADERSHIP AT SPEEDSOURCE

Marcus Shen meets with UF SAE students during a visit to Daytona International Speedway in Daytona, Fla., in 2014.

In 2003, Turlington Plaza was where the course of **MARCUS SHEN'S** life changed forever.

Shen (BS 2008), then a starry-eyed freshman at UF studying mechanical engineering, spotted a display for the Society of Automotive Engineers. Later that evening, he went to their information meeting and joined the team.

Thus began a love affair with building race cars that continues to this day. Shen currently serves as Engineering Director of the SpeedSource Race Engineering team.

SpeedSource fielded winning endurance cars in the Rolex 24 at Daytona in 2008 and 2010 and secured the endurance racing Triple Crown in the latter year, winning the 2010 Team, Driver's and Manufacturer's Championship titles.

During that time, Shen was a race engineer for the No. 70 Mazda car, which won the Rolex 24. After the victory, SpeedSource expanded and Shen was given his own car and crew to run, the No. 68 Mazda.

"Having to manage a crew and different personalities is not something they teach you in school," he said. "So that was a really different experience for me."

Even with having to miss a race that season, the No. 68 finished fifth in the 2010 final standings. SpeedSource's cars finished first, second and fifth. Two years later, when SpeedSource relocated from Sunrise, Fla., to Coral Springs, Fla., Shen got his new job title.

But before the championships, before the promotion — there was SAE.

Shen rose in the ranks in the Formula SAE group yearly. He spent his freshman year as a shop helper. He'd do anything from working on the car to sweeping the floor. By his senior year, he was the lead engineer. In his fifth year, he helped design the car and served as a mentor to the younger SAE students.

Balancing student life and the demands of building race cars was not always easy, Shen said, estimating he spent anywhere from 35 to 60 volunteered hours a week working only on the Formula SAE car. Around that, he had to fit in class time, homework, studying and sleep.

"When most students are away on Spring Break partying," he said, "members of the FSAE team are putting in 12- to 14-hour-plus days working on the new car."

But the work — by Shen and others — paid off. Under the guidance of faculty advisor **MICHAEL BRADDOCK,** the SAE team grew into a formidable opponent on the race track. By Shen's final year, the team placed in the Top 10 in competition for the third straight year. In 2015, UF placed second in competition, UF's highest placement ever, and had the top car built in the United States.

"SAE exists purely because the students that make up the team have a passion for exploring engineering creativity, getting their hands dirty and competiting against the best in the world," Shen said. "The program helps boost the strong curriculum being taught in the classroom by providing real-world experience."

Today, Shen's responsibilities are quite different. In the fast-paced world of motorsports, fires come up fast. As director, Shen must put them out.

"My days are never the same," he said.

Generally, he manages outside suppliers, manages engineers and contractors, makes sure the cars comply with technical regulations, designs car components, analyzes data from tests and race sessions, coordinates budgets, etc.

Shen said the job can be taxing — even overwhelming, with 60-hour work weeks being commonplace — and he has to sacrifice personal time with family and vacations often. However, he said, SAE prepared him for all of this.

"Motorsports requires this," he said. "[SAE] teaches young engineers to be dedicated in order to obtain goals, and it forces them to understand nothing is given out.

Then there are the races. On a race day — a loose term, considering race "day" can last up to 36 to 38 hours for endurance teams — Shen wakes up at 5:45 a.m. to get breakfast and head to the race track for warm-ups and debriefing. When the 24-hour race concludes, the team must spend hours packing and loading equipment.

It's hard work, but when a win comes, it's memorable, Shen said. Equally memorable are the bad days. Twenty-four hours of dealing with a car that has problems means 24 hours of a struggle.

However, when the wins come, like the 2010 victory at the Rolex 24, Shen said the feeling is worth it.

"Winning never gets old," he said.

GILLETTE CONTINUED FROM PAGE 11

By 1980, serving as Pratt & Whitney's project lead, he was assigned the project that would propel him to rock star status in the propulsion industry: the development of the F119 engine.

From its inception in 1980 to its final completion in 1995, he was responsible for design, development and manufacturing from first flight to full-scale operational capability.

The engine's strength is its ability to go supersonic without the use of afterburners. Afterburners, he said, consume twice the fuel an aircraft has. Without the need to use afterburners, the F119 engine increases flight range.

The F119 is equipped on every F-22 Raptor in service today.

He's touched engines that propelled the F-15, the F-16, the F-22, the SR-71, the Atlas V rocket and the space shuttle. Dyslexia may have dashed his hopes of flying, but every one of these vehicles takes a piece of Frank Gillette Jr. on its journey through the skies and beyond.

Giving Back

Despite his success at Pratt and Whitney, Gillette never forgot his roots. He does his best to give back to education.

Following his son Joseph's graduation from UF, he got involved in advisory roles, participating in searches for deans and even suggesting the successful merger of the Mechanical Engineering and Aerospace Engineering departments.

He said he is passionate about helping the industry through mentoring students. His Air Force Academy stint is the perfect example of how far he is willing to go in trying to give back to the people and industry that have helped him.

As a volunteer professor, he doesn't get paid. His travel is covered, but outside of that, he does it free of charge.

Recently, those efforts were rewarded in the form of a Pratt & Whitney endowment to create the Frank Gillette Propulsion Researcher position at the Air Force Academy.

"Frank is truly a pioneer in the field, so we are honored to establish this research position to help build upon the knowledge, expertise and capability of the full-time faculty," said Pratt & Whitney president Bennett Croswell.

If there's one message Gillette said he wishes he could give to today's engineers, it's to give back.

"The alumni have received an awesome education in engineering from UF," he said. "And they will do great things in their field. Gifts from graduates to the engineering college range from $50 to $50 million. No gift is too small relative to what you have received from UF."

CONGRATULATIONS TO:

HIEU "HUGH" TRAN, who is a UF alumnus and recently was named the 2016 winner of ASME's Keith Thayer Exceptional Early Career Engineer Award. The award recognizes early-career professionals who display outstanding dedication, effort and performance in his or her field.

Alumni Profile: Dr. Gary Miller

"We desired to give back to the department and the college and university in a meaningful and specific way to support a program that prepared me to pursue a career that I've loved since my first day in Piotrowski's lab."

Double Gator Dr. **GARY MILLER'S** fondest memory from his early time at UF was meeting his wife of 45 years on the corner of Peabody Hall.

"Remember this was before cell phones and social media," Miller said, "so the big question was how did I get in touch with her and would she be up for a library study date?"

But UF did more than help him meet the love of his life. He credits the university with providing him the opportunity to study a broad range of mechanical engineering topics, which would prepare him for his later participation in Exactech.

He received his B.S. in mechanical engineering in 1970 and a Ph.D. in mechanical engineering in 1977, majoring in machine design with an emphasis in biomechanics.

Prof. **GEORGE PIOTROWSKI** had a significant influence on his life. Piotrowski, who started the first biomechanics lab, introduced Miller to the area of biomechanics as an undergraduate student assistant in the department when he was looking for part-time work.

After graduating with his Ph.D., Miller completed a one-year post-doc fellowship in the UF College of Medicine department of orthopedic surgery as a biomechanist. Afterward, he stayed on as part of the research faculty in the department and eventually became the director of the Orthopedic Research Laboratory.

In 1977, Miller met Dr. **BILL PETTY,** a new member of the orthopedic department faculty at UF's medical school, and they performed orthopedic research together.

Miller and Petty consulted with major orthopedic manufacturing companies. During one of those assignments, Miller grew frustrated with the methods for identifying the design and development needs for improving patient outcomes.

"On one of our trips home, I articulated that I thought marketing was too dominant and that a good plan would be to look at the scientific underpinning of what we were doing, identify what was working and what was not, and the needed improvements would naturally flow from there," Miller said. "I thought that is where the focus should be — making incremental improvements based on science."

Petty, and his wife Betty, invited Miller to partner with them in 1985 to found Exactech, which focuses on designing, manufacturing and distributing orthopedic implants and materials for joint reconstruction.

According to the company's website, Exactech's purpose is to use innovative ideas, education, commitment to service and high quality products to help people maintain their activity and independence and thus improve their quality of life.

In 1996, Miller left the orthopedic department to work full time at Exactech. He has served as the executive vice president for research and development for many years.

"In the beginning we were very small with just three to four of us, so we wore many hats including design, manufacturing, engineering, quality control, regulatory and business aspects of the company," Miller said.

Exactech has now expanded to 400 employees in Gainesville and about 700 worldwide.

MATT HAMILTON Ph.D. is a triple MAE Gator who began working at Exactech in January 2009 and is now the senior product development engineer for extremities focused on computer navigation and lower extremity arthroplasty.

He said that the Exactech culture is different from any other company he has worked for or consulted with.

"Despite having over 600 employees, it feels like a small company," he said. "Dr. Miller as well as Dr. Petty and his wife know most people on a first-name basis whether it is a senior executive or a new employee."

Hamilton said his favorite part about working with Miller is his reassuring positive attitude.

"It allows me to come and discuss challenges with him without concern of judgment," Hamilton said. "He always makes time to help when needed regardless of his hectic schedule. I feel like that is a rare trait and one that should be recognized and appreciated."

Over the years, Miller has moved toward more executive activities but said he still stays closely involved in design team activities.

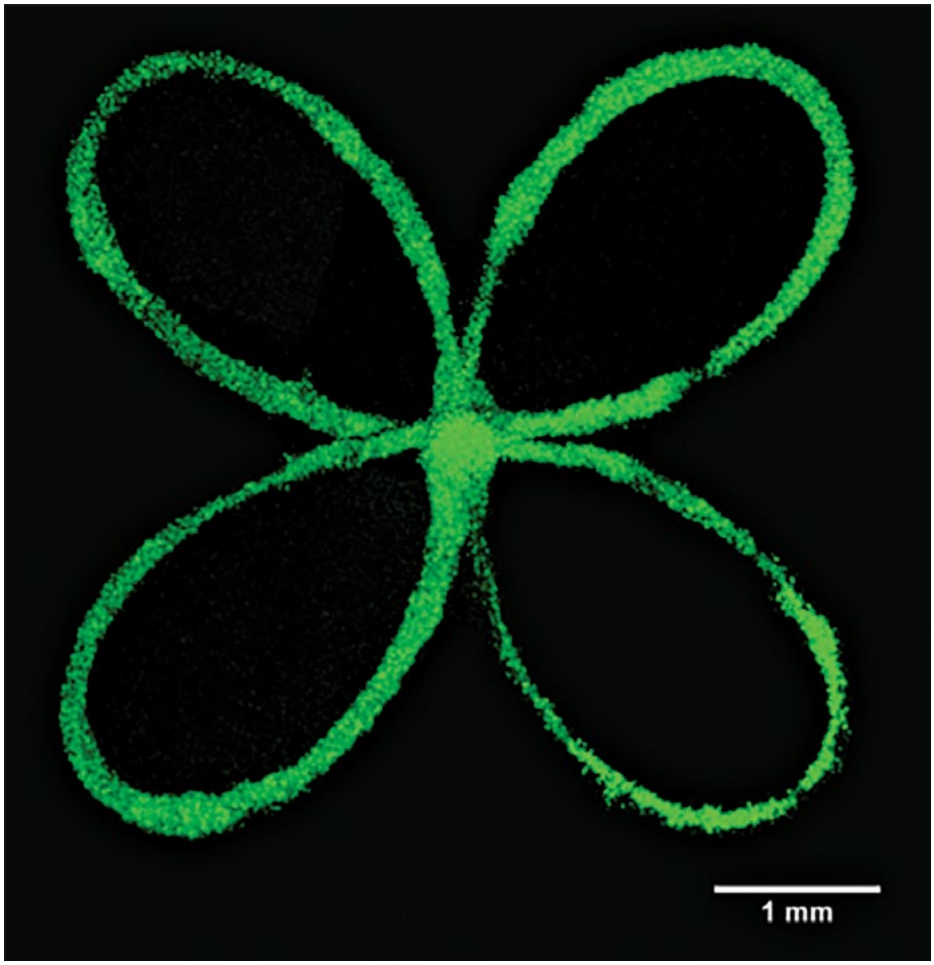
"It has always been incredibly rewarding to see people who benefit from the work that I do in a very real way," Miller said. "Knowing that someone suffering from arthritis and other orthopedic problems has received a product that the company has developed and now has an improved quality of life is a great feeling. It's what keeps me motivated to continue to do what I do."

Miller credits UF for a lot of his success.

"MAE helped me prepare for my career in innumerable ways," he said. "It began with my undergraduate experience and a host of great professors, including Dr. Erich Farber. Most important was my first exposure to Biomechanics with Dr. George Piotrowski, which put me on a path to graduate school to acquire the tools for a fulfilling career in the 'new' area of Orthopedic Biomechanics."

Because of UF's role in preparing him for his career, Miller has felt compelled to give back to the college. He and his wife Suzy Miller made a generous donation to the Gary J. Miller Orthopedic Biomechanics Lab, named in his honor.

"We desired to give back to the department and the college and university in a meaningful and specific way to support a program that prepared me to pursue a career that I've loved since my first day in Piotrowski's lab," Miller said. "We want to help provide the potential for others coming through engineering to have a similar experience."



A LIVING LEMNISCATE.
A new method of 3D printing of soft structures has recently been developed at **DR. TOMMY ANGELINI'S** lab, which potentially solves many challenges in 3D cell growth materials. PhD student **TAPOMOY BHATTACHARJEE** and colleagues are now using liquid like solids (LLS) made from packed microgels for 3D printing. The image shows a complex lemniscate printed directly with breast tissue cells inside LLS cell growth medium.

2016 MAE Outstanding Alumnus Award Winners

(*from left*) Stephen Sprigle (Georgia Tech), Richard Griffin (Visioneering Technologies & Florida Optical Engineering), David Hahn (MAE Chair), Louise Scott (Georgia Power & Southern Company), Mark Lowery (JAX Refrigeration), Jenn Gustetic (NASA & White House OSTP) and T. Trase Travers (Millennium Engineering & Integration). Congratulations on all of your professional accomplishments!

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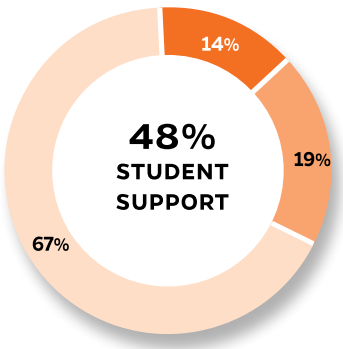
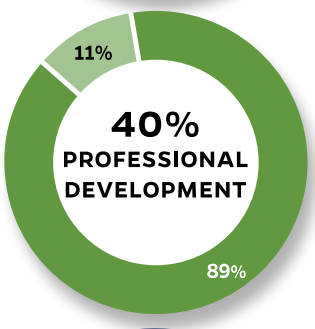
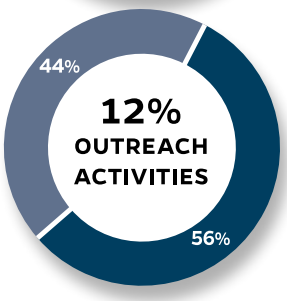


- Awards and Scholarships
- Student Activities and Professoinal Development
- Student Design and Build Projects and Facilities



- Faculty Academic and Research Support
- Seminar Speakers and Faculty Development



- Faculty, Staff and Student Outreach and Recruitment Activities
- Promotional, Marketing, Recruitment and Publications