

CLIMATE CHANGE
AND CAREERS

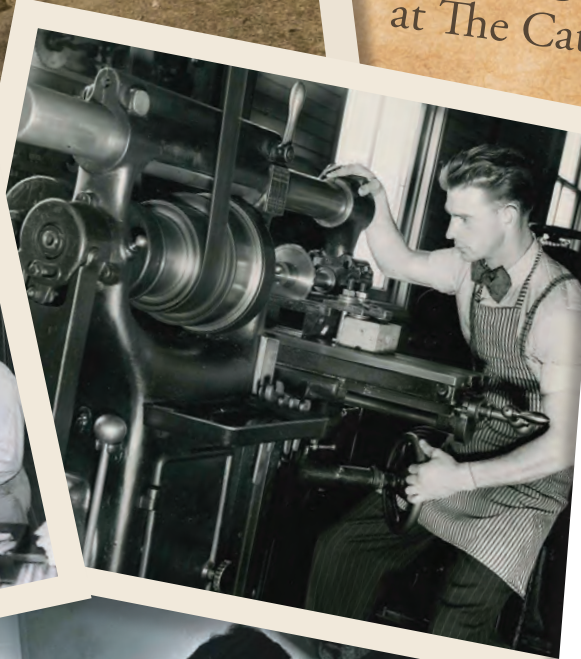
DEAN JUDGE IN THE
PANDEMIC CLASSROOM

CO-OPS AND
INTERNSHIPS

CATHOLIC UNIVERSITY | Engineer

Fall 2022

125
YEARS OF ENGINEERING
at The Catholic University of America



DEAN

John A. Judge

ASSISTANT DEAN

Diane Miranda, B.A. 2005

**ASSOCIATE DEAN FOR
GRADUATE PROGRAMS
AND FACULTY**

Hang Liu

**ASSOCIATE DEAN FOR
PROFESSIONAL PROGRAMS**

Richard C. Thompson Jr., Ph.D. 2012

PRODUCTION MANAGER

Liz Schack

WRITERS

Katie Bahr

Gregory Behrmann, Ph.D. 2009

Jason Davison

Susan Gibbs

John Judge

Katie Lee

Gunnar Lucko

Liz Schack

COPY EDITOR

Susan Gibbs

ART DIRECTOR

Kristin Reavey

GRAPHIC DESIGNERS

Katherine Kaderabek

Rebecca Sales

PHOTOGRAPHER

Patrick Ryan

Dean's Welcome



As Catholic University welcomes its new president, it's a great time to look back at the distinguished history of the School of Engineering and forward to its bright future.

As our cover story highlights, we're celebrating 125 years of engineering at Catholic University. Throughout our history, we've combined small class sizes and personal attention with cutting-edge research. Today, our connections throughout the Washington, D.C., region enhance research opportunities, open doors for internships and jobs for our graduates, and let us partner with local industry and government to provide workforce development through advanced degree offerings.

Peter Kilpatrick, the University's 16th president, is the first engineer to hold that position. A chemical engineering professor who began his career at North Carolina State University, Kilpatrick has served as dean of the school of engineering at the University of Notre Dame, and provost at the Illinois Institute of Technology. He joins us at a time of many challenges and opportunities. Enrollment has rebounded after a pandemic-related drop, and the University is making investments in both undergraduate and graduate recruiting and working hard to clearly communicate the great value of a Catholic University education. One of our faculty members, Dr. Jason Davison, is principal investigator on a new \$750,000 grant from the Office of Naval Research to expand opportunities for young people from all backgrounds to pursue careers in science and engineering. Our provost, Aaron Dominguez, Ph.D., has challenged the University to reach the upper echelons of national research universities, and is making investments to strengthen research infrastructure and support. Here in Pangborn Hall, we're continuing to invest in renovations and equipment to facilitate research and to enhance education, and continuing to make career connections for students with new internship and co-op programs.

The University's new dining commons will be opening this fall, and construction is underway on the new home for the Conway School of Nursing. As the University nears completion of its Light the Way fundraising campaign and sets its sights even higher, I'm thrilled to partner with our faculty, administration, and new president to develop plans for expanding the School of Engineering and building the facilities it needs to continue providing outstanding education and advancing the state of the art in engineering and computer science.

I hope you enjoy this issue of Catholic University Engineer, and are as proud as I am of our history and as excited about our future!

John Judge
Dean, School of Engineering

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Dennis McCahill, founder and former director of the Construction Engineering and Management Program.

Celebrating 30 Years of Construction Engineering and Management Success

Just a few days after May 2022 Commencement, the School of Engineering held another celebration to mark the 30th anniversary of the Construction Engineering and Management Program (CEM), and to celebrate the founder and former director, Dennis McCahill.

“I didn’t know that was a day that was going to change the rest of my life,” said Jon Clark, B.C.E. 1997, recalling a conversation he had with McCahill before he started college that convinced him to become an engineer. The current project executive for Manhattan Construction Company added, “I learned a passion

for my industry...It’s not often you get to thank someone who has changed your life.”

Clark noted that his daughter is now a student at Catholic University and that Manhattan Construction has started a co-op program with the University’s engineering school, continuing his connection with the Construction and Engineering Program. As other alumni spoke during the evening, the impact of McCahill on the program and on them emerged. They shared life lessons, quotes to remember, and skills they learned that went far beyond engineering — from how to shake hands to public speaking — that have helped them succeed in their careers.

“Truth. Honesty. Integrity. Never cheat anyone. Never cut corners on anybody. Treat your clients as you would like to be treated. In the long run it will always be to your advantage to behave in that manner. And that’s one of the reasons that the reputation of this program is as good as it is. There’s you people sitting in this room embodying those characteristics and I’m proud of all of you.”

McCahill’s commitment to ethics, high quality course content, small class sizes, and faculty support remain hallmarks of the program, which to date has prepared nearly 350 graduates for careers in construction management and engineering.

McCahill required and arranged summer internships that, in many cases, jumpstarted careers in construction management and construction engineering. In his own remarks, he noted the contributions of George Quinn, who provided seed money for the program as well as industry contacts.

Gunnar Lucko, professor of civil engineering, took over leadership of CEM in 2005. It has since grown into a full research program with students in undergraduate, master’s and doctoral programs and retains close ties with alumni, many of whom return to recruit students for their companies, and with Mid-Atlantic industry professionals.

He spoke about how the program is adapting for the future, saying, “Educating construction professionals for the 21st century must ... build the ability to solve complex challenges through critical thinking, analytic decision-making, creativity, and integrity. It must be grounded in the engineering fundamentals, kept relevant with lifelong learning, and manage risk and expectations for all stakeholders within sustainable development and globalization.”

Funding from the National Science Foundation, Charles Pankow Foundation and other entities is supporting CEM research into new ways to model, analyze, and optimize the time, cost, resources and operations of construction projects as the program continues to prepare graduates with new skills for a changing field.

Lucko thanked Manhattan Construction Group, Bozzuto Construction Company, and Whiting-Turner Contracting Company for their

co-op programs with Catholic University, and Whiting-Turner, Consigli Construction Company, John Moriarty and Associates, and Gilbane Building Company for their sponsorship of the April 2022 Climate Change and the Future of Work Conference.

Clearly touched by the evening’s tributes, McCahill offered his former students a few more life lessons, ending with, “Truth. Honesty. Integrity. Never cheat anyone. Never cut corners on anybody. Treat your clients as you would like to be treated. In the long run it will always be to your advantage to behave in that manner. And that’s one of the reasons that the reputation of this program is as good as it is. There’s you people sitting in this room embodying those characteristics and I’m proud of all of you.”



Left to right: John Judge, dean, School of Engineering; Dennis McCahill, founding director, CEM; Arash Massoudieh, professor and chair, civil engineering; and Gunnar Lucko, professor and director, CEM

Sica Family Bequeaths \$5 Million to Catholic University



Vinny Sica with Parents Council Co-Chair Becky Mascolo and University Trustee Jeff Rossi, B.A. 1975, J.D. 1978 at an 1887 Society event.

For the past 37 years, Vinny Sica, B.M.E. 1983, and his wife Ellen Sica have been dedicated supporters of Catholic University, generously sharing their time, talent, and treasure. In August 2020, they strengthened their legacy by bequeathing \$5 million to the University in support of the School of Engineering and the Cardinal Athletics football program.

Vinny made his first gift to the University in the fall of 1983, just after he graduated — around the same time he met Ellen. He started with \$100 and continued to give what he could every year thereafter. Ellen’s family also has a strong tradition of philanthropy, particularly in support of their universities, and that encouraged Vinny to keep giving.

“I just kind of assumed that everybody gave something to their alma mater when they graduated. It didn’t have to be a significant number. So I gave what I could, and I just kept doing it. We’ve been very blessed and in a position to give a good amount over the years,” said Vinny.

“Because we have always given, even right out of school, we told our kids that \$100 a year is basically a nice dinner out. So right when you graduate, just start with a little bit, and do it each year,” Ellen said. Over time, they began to make larger gifts. Vinny and Ellen have since funded two impact scholarships and consistently supported the School of Engineering and Cardinal Athletics. They are part of the 1887 Society, which recognizes leadership annual donors.

“I just kind of assumed that everybody gave something to their alma mater when they graduated. It didn’t have to be a significant number. So I gave what I could, and I just kept doing it. We’ve been very blessed and in a position to give a good amount over the years.”

The couple even has a dedicated booth at Murphy’s.

Vinny has also dedicated a significant amount of time volunteering in support of his alma mater. In 2002, he began serving on the Advisory Board to help renew the School of Engineering’s ABET accreditation in



“We want to keep the football program going, because I see a community in Vinny and his friends that I never had at my school, and today some of our good friends are his fellow Catholic football players.”

mechanical engineering. After a few years, he joined the school’s Development Board, which later became its Board of Visitors. Five years ago, he switched over to the Athletics Board of Visitors to help drive support for student-athletes. In 2020, he accepted the University’s invitation to join the Board of Trustees.

He credits the hands-on education in mechanical engineering he received at The Catholic University of America for his successful 35-year career in the field. Vinny found his very first internship through the employment posting board at the University’s career office, which led to his first full-time job. He spent most of his career with the firm known today as Lockheed Martin Corporation, retiring as a vice president and general manager for Lockheed Martin’s space division in 2018.

In order to ensure future generations of engineers have similar opportunities, \$2 million of the bequest will be used to establish the Sica Family Endowed Scholarship Fund for undergraduate scholarships in the School of Engineering.

“It really comes down to the quality of a small-school education, a small engineering school in particular, and the benefit you get from knowing your teachers, being hands-on, is much more involved than just sitting in a big lecture hall,” Vinny said. “It’s expensive — most small-school experiences are not cheap. We want to give students

an opportunity to afford that small, private school education.”

Another important aspect of Vinny’s Catholic University experience was his time on the Cardinal football team. He played on the offensive line for four years and captained the team as a senior. To honor those memories and help drive the program into the future, the couple has pledged \$3 million to establish the Vincent and Ellen Sica Endowed Coach for Catholic Football.

“Division III athletics are really important for folks who want to get a good education and continue playing a sport,” Vinny said. “We’ve been donating to the athletic program for 37 years, and we want to keep building it, and to do that you need stability and quality in the coaching staff.”

Vinny still keeps in touch with his former Cardinal head coach, Joe Pascal, and he and Ellen are friends with many of his teammates. That bond was a deciding factor in choosing to endow the head coaching position. As an honorary Cardinal, Ellen also has a vested interest in the University and the team’s success. “We want to keep the football program going, because I see a community in Vinny and his friends that I never had at my school, and today some of our good friends are his fellow Catholic football players,” said Ellen.

This bequest was in the planning stages for almost a year. Last fall, Vinny attended a luncheon for the St. Thomas Aquinas

Society, a community of alumni, parents, faculty, staff, and friends who have made planned gifts to The Catholic University of America. The Sicas were already updating their estate planning, and this seemed like the natural next step to continue their support for the University.

“It’s going to take a while for Catholic University to actually see the money, hopefully,” Vinny joked. “It came down to the fact that I’m taking some of the money I was already giving each year and paying it toward this future gift. It’s a smart way to support the school, alongside my normal annual giving.”

The gift also counts toward Light the Way: The Campaign for Catholic University. This comprehensive campaign is the first of its kind for the University, and Vinny and Ellen were impressed with the public rollout in 2019. The Campaign inspired them to do even more to help preserve and advance the University’s mission for generations of future Cardinals.

“We just want to make it a better place than it was yesterday,” Vinny said. “We got a ton out of my time at The Catholic University of America, and then we spent a lot of time helping try to make it better for the next generation. That goes on and on, so you kind of continually pay it forward.”

Back in the Classroom, Dean Judge Adapts to Pandemic Teaching

Dean John Judge missed interacting with students, so he decided early in 2020 that he would teach a course that fall. Despite unexpected pandemic restrictions, the students in his course thrived and Judge learned to teach in new ways. Appointed dean of the School of Engineering in 2017, John Judge took a break from teaching so he could focus on his administrative duties. But by January 2020, he missed interacting with students in the classroom, so he decided he would teach a course for first-year engineering majors. Little did he know what that decision would involve.

The schedule of courses for fall 2020 was finalized in February of that year, before news of the COVID-19 virus had reached the United States. A month later, the virus sparked a pandemic that quickly spread around the world.

“For several months, we didn’t have any idea what the fall would look like,” says Judge, an associate professor of mechanical engineering who joined the University in 2004. “Everyone hunkered down, just trying to make it through the spring.”

When Catholic University announced in late summer 2020 that only first-year students would return to campus that fall, Judge realized he was one of just a handful of engineering faculty members scheduled to teach in person.

With just a few weeks until the start of the semester, Judge and his co-teacher, Associate Professor Jandro Abot, found themselves grappling with the challenge of teaching Introduction to Engineering Design and Professionalism, a required course for first-year engineering majors, in the midst of a pandemic.

That fall, most of the first-year students moved into residence halls on campus, but some stayed at home and took classes remotely, so the dean and Abot had “to pivot and adapt on the fly” to teaching both in-person and via Zoom, says Judge.

Pangborn Hall, home of the engineering school, was quieter than usual because students didn’t hang out there between classes. The dining areas in the Edward J. Pryzbyla University Center were closed. First-year students picked up boxed meals and ate in their rooms or outside, if the weather was nice.

Judge and Abot quickly learned that it’s much easier to manage teaching either when it’s all in person or all online. Managing a mix of the two or “hybrid teaching” is challenging because the two scenarios involve different logistics. But the hybrid model “is a lot easier if you have two professors teaching,” says Judge. During the lectures, which were online, one of the professors would teach while the other answered questions and shared links on the Zoom chat.

With so few students in classrooms and residence halls, “it was a bit of



“For several months, we didn’t have any idea what the fall would look like...everyone hunkered down, just trying to make it through the spring.”



Dean Judge instructs first-year student Gangoum Temdenou in fall 2021.

a ghost town that fall,” says Judge. But as the semester progressed, Judge says he felt fortunate to be teaching in person. “A lot of the Catholic University community went months without seeing anyone on campus. I was able to see people face-to-face.”

Developing Resilience

When mechanical engineering major Olivia Rees, now a junior, learned in summer 2020 that she would be living on campus that fall, she says she was “very excited, but a little nervous.” In addition to the usual pre-college jitters, she was anxious about living on campus during a pandemic. “I didn’t know what a COVID-safe campus would look like, with social distancing and wearing a mask all the time.”

Rees, of Sykesville, Md., was a high school senior when the pandemic broke out in March 2020. She quickly segued from learning in a classroom with her friends to taking all of her classes online. Initially, when she learned that only first-year students would be living on campus, she was a little confused. “I wondered why the freshmen were special. Why would we be the only students on campus?”

Judge says, “We felt it was important for first-year students to have something at least approaching a normal college experience.” Apparently the experience was positive for a majority of the students. The retention rate for first-year students who started in fall 2020 and returned in fall 2021 was 89% — the highest ever in University history, Judge says.

Rees, who hopes to one day design satellites for NASA, grew up with a strong interest in math and science. As a kid, Rees loved

playing with Legos so she was excited about the lab project for Judge’s course that involves designing a computer-programmed Lego robot that battles other robots in what’s known as “the sumo competition.”

A natural teacher with a boyish face, Judge is funny, engaging and enthusiastic with students.

“Dean Judge was there for the sumo battle, filming videos on his phone and cheering us on,” says Rees. “He was so into it.”

Rees says her experience in fall 2020 helped her realize that “you can develop the resilience to deal with stressful changes.” She notes that getting to know the dean was an added boost during an uncertain time.

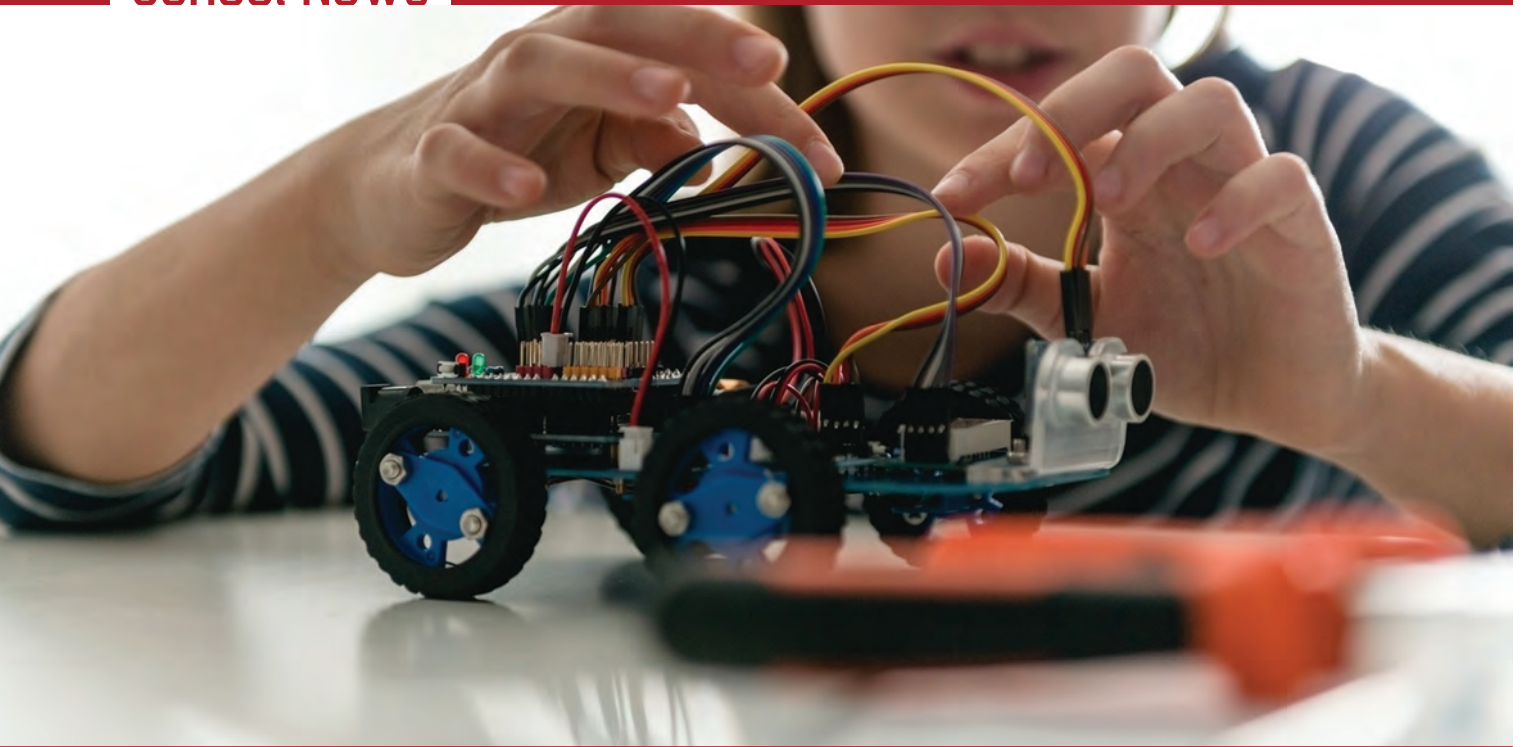
The experience also enabled members of her first-year class (the class of 2024) to bond in a way that might not have occurred during a non-COVID semester, says Rees. “You couldn’t help but get to know pretty much everyone in our class that semester.”

Studying Online in Puerto Rico

Before deciding to teach the introductory course, Judge says he thought about teaching an upper-level course in his area of expertise — dynamics and vibration. “But I thought it would be better for the school and for incoming students to get to meet the dean. It was a chance for me to get to know them as they were coming in the door.”

In fall 2020, Judge and Abot had 72 students in the course. The D.C. government’s COVID regulations restricted gatherings to 50 people with six feet between each one.

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For the lab sections, the professors used the spacious senior design center on the second floor of Pangborn, where groups of about 25 students could meet safely for hands-on lab projects.

The course, which Judge and Abot taught together again in fall 2021 and are teaching in fall 2022 with Assistant Professor Rebecca Kiriazes, is designed to give students access to the engineering design process early in their undergraduate studies and to acquire basic knowledge about the profession.

“Despite being engineering majors, many first-year students really don’t know what engineering is all about,” says Judge. “If they’re good at math and science, they’ve probably been told they should be an engineer. This course gives them an overview so they can figure out which area of engineering they’d like to pursue.”

Biomedical engineering major Maria Huerta, who is immunocompromised with asthma and allergies, decided to stay in her native Puerto Rico for the fall 2020 semester and take classes online. Her parents, both doctors who were curious about Huerta’s online learning, were pleased when they discovered that she was taking a course with the engineering dean. They saw the course as “a great opportunity,” Huerta says.

Even though she was in Puerto Rico, Huerta, now a junior, says she never felt “left out” during the course. Joining her classmates via Zoom, Huerta was able to follow the lectures and labs. If she emailed questions, one of the professors responded quickly. When she was having an issue with the Lego robot project, she stayed on Zoom after class one day and resolved the problem with the professors’ help.

Dueling Lego Robots

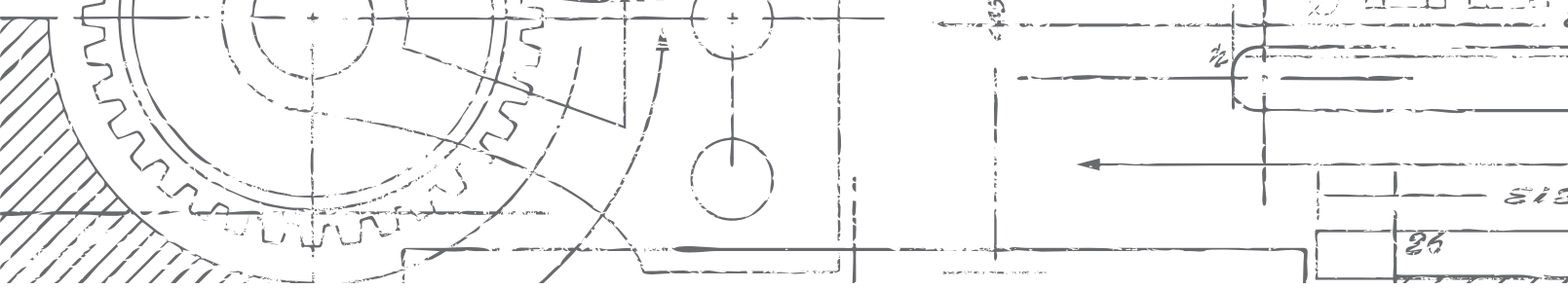
On the last day of the course, students gathered in Pangborn’s first-floor lecture hall to compete in the Lego sumo competition, an elimination-type tournament that took the place of a final exam. Teams of students took turns squaring off with their robots, setting them inside a space on the floor marked with black tape. Serving as the referee, Abot yelled “1, 2, 3,” and then with a loud clap, “go!” The students cheered as the robots battled each other.

Liam Coster’s team won their first match-up with a robot that wielded a battering ram designed to force its opponent off the ground. The team lost in the second round of the competition when their robot faced an opponent with a low center of gravity.

“Our robot wasn’t very heavy, so we didn’t get the lift we needed to force the other robot out of the box,” lamented Coster of Ramsey, N.J. Despite the loss, Coster says he and his teammates were happy with their robot’s performance.

At the beginning of the semester, Coster wasn’t sure which of the engineering school’s degree programs he wanted to pursue. By the time the course was over, he had decided to major in electrical engineering, noting that Judge and Abot “did a great job of presenting different career options in the field.”

Coster says that having navigated his first semester with the dean as one of his professors makes him feel confident. “When you’ve been taught by the dean, it makes you feel like you can take whatever the school throws you.”



Board of Visitors Chair Supports Student Internships

Most students in engineering and computer science fields work at one or more internships prior to graduation, gaining valuable work experience that complements their classroom learning. In spring of 2020, as the COVID-19 pandemic shut down campuses and offices around the world, some students had their summer internship plans shift online, while others had their summer offers delayed or canceled. When a survey of current students revealed the extent of the disruption to summer internship plans, the School of Engineering leadership knew that something needed to be done to make sure students still had opportunities.

Enter the chair of the School of Engineering's Board of Visitors, Bob Kavetsky, B.M.E. 1975, who made a five-year commitment of \$125,000 through his company, Energetics Technology Center (ETC), to fund internal internships for students in faculty research labs. Through this program, students gain work experience while providing invaluable research assistance to faculty members.

"The beauty of this gift is that it simultaneously strengthens our students' preparation for the workforce and supports the research being led by our faculty," said Dean John Judge.

This gift came at a crucial time, allowing the school to employ students who had lost internships or were unable to find them due to the effects of the pandemic. Faculty members were in the midst of transitioning to online and hybrid coursework, so having additional researchers helped to advance their work, despite these challenges.

During the summer and fall of 2020, six projects were funded through this initiative, providing paid internships for 11 students across a variety of disciplines, including mathematics and biomedical, civil, environmental, and mechanical engineering. Faculty members were awarded up to \$6,000 to hire one or more interns during the initial period. Several of the projects were renewed with additional funding for the spring and summer of 2021.

Thanks to the initial summer 2020 interns, professors were able to advance their work in designing a rapid test for SARS-CoV-2 without nucleic acid amplification, developing a machine learning algorithm to track plastic waste in the Anacostia River, investigating seismic-induced damage in steel liquid storage tanks, studying the industry implications of gaining a continuous performance tracking model, setting up and working with a Formlab Form 2 3D printer, and analyzing the nature

of crime using graph theory. Numerous new projects have been funded beginning in both summer 2021 and summer 2022, expanding the impact of the program, which has not only been a benefit to faculty and students in the School of Engineering, but also strengthened the partnership between the University and ETC.

"The benefit to ETC is twofold. First, we maintain a good connection with professors and their students, so we get an early peek at who might be promising future employees," Kavetsky said. "Second, in the coming years, we are going to provide 'challenge problems' for the professors and students to work on, which will directly benefit our programs at ETC."

As engineering and technology companies have reopened their offices, plants, and job sites, School of Engineering students are again finding in-person internships at a wide variety of organizations, but the benefits of the internal internship program continue, creating more options for students, supporting research within the school, and allowing organizations like ETC to forge a connection to students working on campus. The School of Engineering intends to expand the program with additional funding in future years to maximize the opportunities for students while strengthening such partnerships and supporting faculty research projects.

"The beauty of this gift is that it simultaneously strengthens our students' preparation for the workforce and supports the research being led by our faculty"

Bob Kavetsky



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YEARS OF ENGINEERING

at The Catholic University of America

While the history of the school of engineering at The Catholic University of America dates back to 1930 and the tenure of Hardee Chambliss, Ph.D., its first dean, the study of engineering at the University began 34 years earlier, with the establishment of an engineering program in 1896. From the engineering majors who made up most of the University's first undergraduate class, to the nation-leading percentages of women earning their master's degrees from the school today, engineering students have been at the forefront of progress at Catholic University. Before the school took up residence in Pangborn Hall in the early 1960s, engineering classes and research occupied an array of different buildings on campus, from McMahon Hall, where Albert Zahm launched cannonballs for aerodynamics research, to the wind tunnel he constructed for his research, to the University power plant, described in 1954 as "the real headquarters for the Mechanical Engineering Department," where "above the surging boilers and whirling generators, a vast room forty feet high houses the offices, classrooms, drafting room, and testing areas of the department."

Another big change from the engineering program's origins is the cost of tuition — \$75 "per annum" in 1910 (when the fall term opened on the 4th of October!); however, announcements exhibited a familiar pride in the campus's Washington, D.C., location, occupying "a commanding site comprising 70 acres, situated within the city limits," and boasting "excellent street car and railroad service [which] brings it within 15 minutes' ride of the center of the city." What follows are a few images from the history of the school of engineering, with a special thank you to our alumni contributors. If you want to share your (or your older relatives') memories from Catholic University, email the school at cua-engineer@cua.edu.



THE CATHOLIC UNIVERSITY OF AMERICA
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 Fall Term Opens Tuesday, Oct. 4, 1910.
 Courses Leading to Degrees and Practical Careers

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 Course of Study, Three Years. Degree: LL. B.
 GRADUATE DEPARTMENT OF COMMON LAW.
 Course of Study, Three Years. Degree: LL. M., J. D.
 DEPARTMENT OF CIVIL AND CANON LAW.
 Course of Study, Five Years. Degree: B. C. L., M. C. L., D. C. L.
 DEPARTMENT OF JURISPRUDENCE.
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LAW STUDENTS may follow courses in other departments: Philosophy, Letters, Sociology, Political Economy, History, Science.

GRADUATE WORK is encouraged, and similar work is arranged for hours convenient to such students. Members of the Bar and others who have received a baccalaureate degree, are admitted to the advanced courses in the Common Law, the Department of Civil Law, and the courses in Jurisprudence (philosophical, historical, and comparative).

Courses in Engineering
 Lectures and Laboratory Work.

CIVIL ENGINEERING—
 Mechanical Drawing, Land Surveying, Graphical Statics, Geodetic Surveying, Structural Design, Roofs and Bridges, Hydraulics, Masonry and Foundations, Sanitary Engineering, Water Supply Engineering, Highway Construction, Railway Construction, Shopwork.

MECHANICAL ENGINEERING—
 Mechanism, Machine Design, Engines and Boilers.

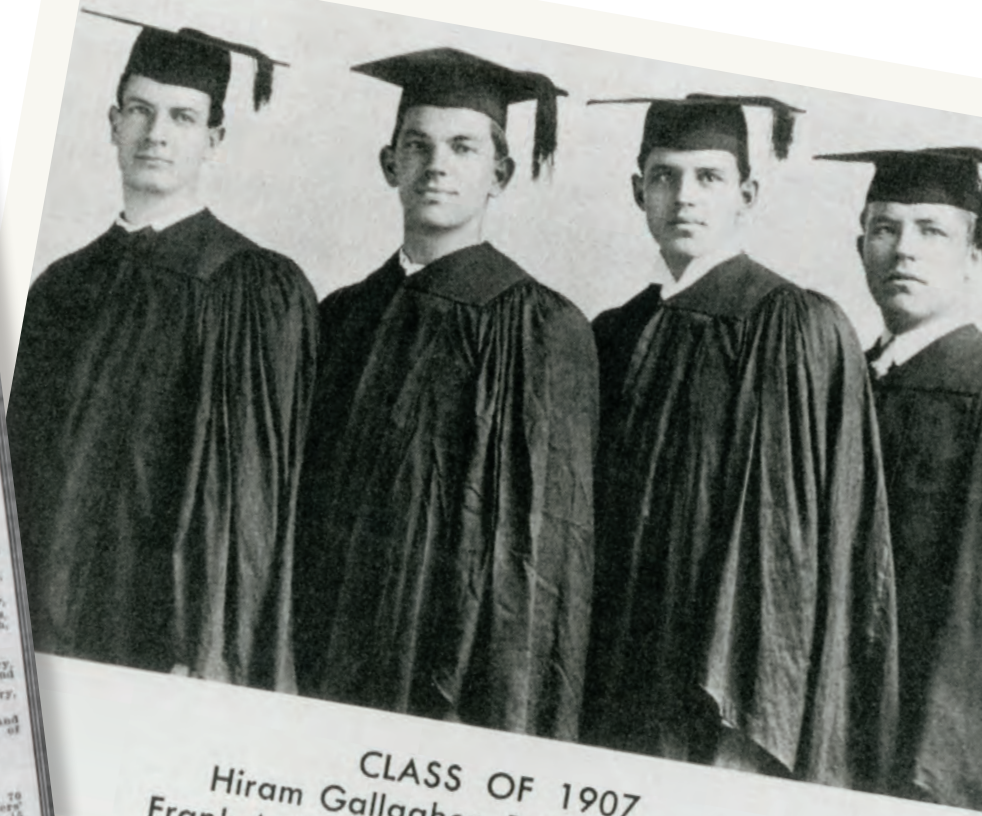
ELECTRICAL ENGINEERING—
 Direct Current Machinery, Alternating Generators and Motors, Design of Generators and Motors, Electric Lighting, Electrical Distribution of Power, Primary and Secondary Batteries, Telephone and Telegraph, Electric Railways.

EQUIPMENT—
 Physical Laboratory and Library, Chemical Laboratory, Library and Museum, Engineering Laboratory, Astronomical Observatory.

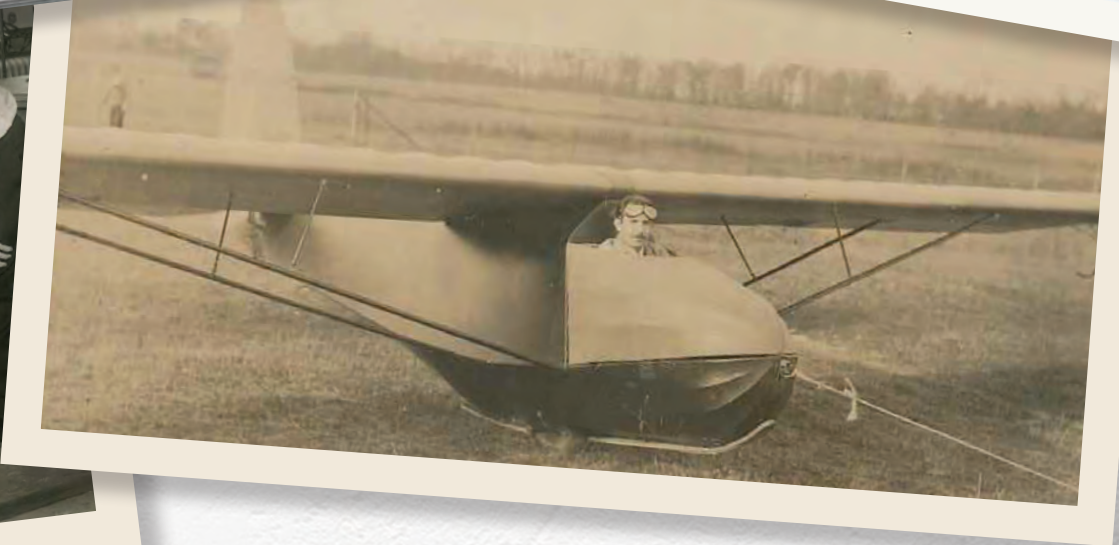
For courses in Mathematics, Astronomy, Physics, Mechanics, and Chemistry, and for degrees and their conditions, see announcements of the School of Sciences.

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TUITION, \$75 PER ANNUM.

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CLASS OF 1907
 Hiram Gallagher, Brawner Heffield,
 Frank A. Kuntz (President), John C. Moran.



The [undergraduate] students regarded the University as tops. There were so few of us in each class that we were getting almost individual tutoring by renowned professors, carefully selected by the University because of their academic rating. There was not a single one of us who did not brag about the fine education he was getting at such a reasonable cost. The professors, in turn, were pleased that their classes were enlarged by students who respected them so highly.

— FRANK KUNTZ
 B.E.E. 1907
 From his memoir Undergraduate Days: 1904–1908





In a senior lab we were getting acquainted with Vacuum Tubes (or as the Brits said “Valves”). The week before we went through the laborious task of plotting triode operating curves when the lab manager announced we would be drawing the operating curves this week on Pentodes (groan). Then he wheeled out a marvelous machine — The Tektronix 526 Tube Curve Tracer, which with a 10-minute setup painted the tubes’ operating curves on a small TV screen. So what’s the big deal? Well, I was so impressed with the appearance, feel and operation of this time saving machine (which was on loan from the Tek Field Engineer) that I interviewed with Tek and went through the ranks up to System Div. Marketing Manager and a 20-year career at Tektronix, with its pioneering innovations in several fields.

— ROBERT MEEHAN
B.E.E. 1960



I spent 43 years in automotive engineering as a result of my CUA B.M.E. degree. I was employed by Ford Motor Company for thirty years. Subsequently, eleven years with Dana Inc. and the last couple with Nemack Inc. The fine base of engineering provided me with the tools to work with engine fuel systems, warranty and reliability, occupant safety systems and seating at Ford. Driveshaft and axle applications at Dana and aluminum casting resident engineering for Nemack. I also hold a U.S. design patent jointly with Ford for a restraint and seating interface design.

— JEFFREY CARROLL TAYLOR
B.M.E. 1977







Fun fact about the CUA engineering school: the professors are actually pretty nice and care about students. Right before winter break one year our professor bought the whole class Starbucks and cookies because we all completed our labs on time. Our professor didn't promise this or even tell us, they simply said we all deserved it for putting in the effort to come to class and do our best. It's a memory I look fondly back on and it's one of the many reasons I'll always be thankful for choosing CUA.

— ALYSSA BRYAN
B.B.E. 2018



//EYE ON FACULTY

Distinguished Faculty Fellowship Awarded to Peter Lum

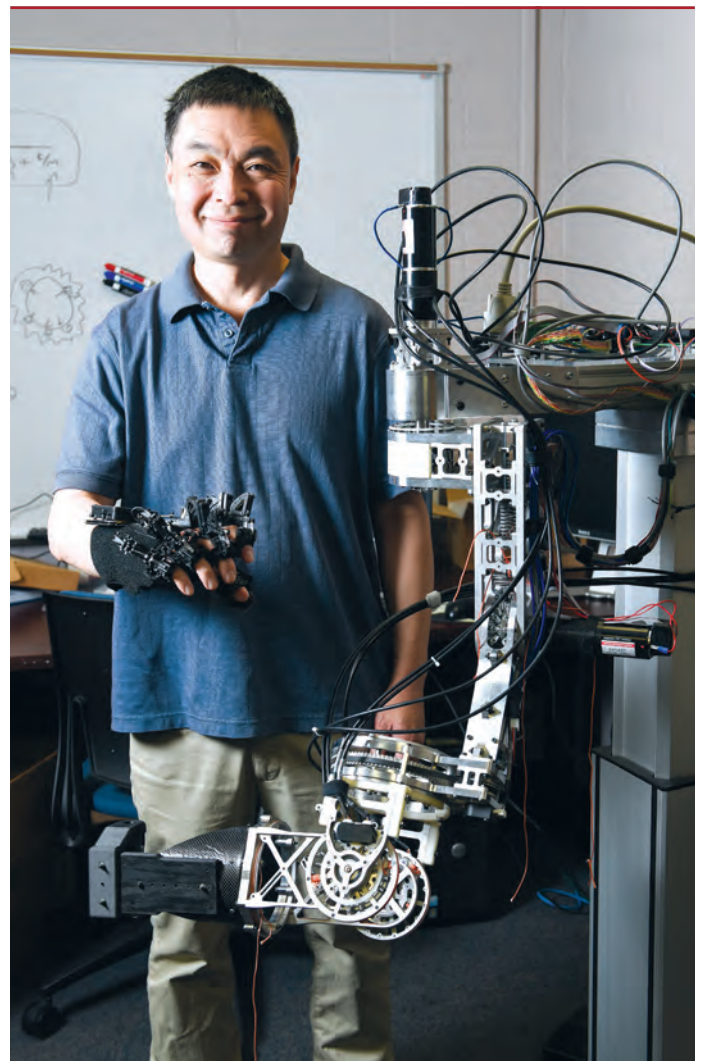
Peter Lum, Ph.D., professor of biomedical engineering, is the inaugural recipient of the School of Engineering's new Professor Robert Meister Distinguished Faculty Fellowship. The fellowship honors faculty who have made outstanding contributions to the School of Engineering through their research, teaching, and service. It is named in memory of the late Robert Meister, Ph.D., a beloved member of the University community for over seven decades, and made possible by a generous gift from the Meister family and former students of Meister.

After serving in the Pacific during World War II, "Bob" Meister enrolled as an undergraduate student in 1946. He earned his bachelor's degree in electrical engineering in 1949, then a master's degree and doctorate in physics, all from The Catholic University of America. Meister joined the Electrical Engineering Department's full-time faculty in 1958, and served as chair of the department from 1971 to 1997. Under his leadership, the department hired both its current chair, Nader Namazi, and Dean Emeritus Charles Nguyen, who succeeded Meister as department chair before going on to lead the school as dean for 16 years. Upon his retirement from full-time service in 2006, Meister was made professor emeritus, and continued making contributions to the school well into his retirement. He was nearly 94 years old when he passed away in January 2019.

Peter Lum, who will hold the Meister Fellowship for a three-year term, has been a faculty member since 2005. He was promoted to associate professor in 2009 and full professor in 2017. He served as chair of the biomedical engineering department from 2012–2021, and he also served as the school's associate dean from 2017–2018. He is an outstanding researcher, whose papers have been cited over 8,000 times, and who has received over \$18 million in external grant funding as principal investigator or co-investigator, included the lead role in the School of Engineering's Rehabilitation Engineering Research Center, established in 2018 with a five-year grant from DHHS, and a recent key role in establishing a collaboration with the University of Maryland on a second Rehabilitation Engineering Research Center.

He is a strong teacher and has been an excellent mentor to junior faculty in his department and to his many graduate students, including 10 who have completed their PhD. under his guidance and 3 more currently working in his laboratory. He has served his department, the

School of Engineering, and the University in a variety of capacities, including current work on the University Research Operations Committee, which is tasked with strengthening the University's research enterprise.



Peter Lum



U.S. Department of Energy Deputy Secretary David M. Turk gives the keynote address.

Climate Change and the Future of Work Conference

In conjunction with Earth Day 2022, The Catholic University of America hosted a conference — Climate Change and the Future of Work — to explore the ways in which climate change will continue to reshape the global economy that students will be entering upon graduation. Featuring speakers from government, industry, nonprofits, and academia, the conference exposed attendees to the breadth of the climate crisis’ effect on the workforce and introduced students to varied potential career paths.

Cardinal Wilton Gregory, Archbishop of Washington and the University’s chancellor, opened the conference on the evening of April 21 by contextualizing decarbonization of the economy and the pursuit of sustainability within the Catholic faith. His address emphasized the moral obligation of humanity to care for our common home and called upon the audience to protect the environment as part of their commitment to protecting human life. Cardinal Gregory noted that the poor, people of color, and other marginalized people are often most impacted by environmental destruction, and encouraged students to prioritize environmental justice as they enter the workforce.

The next morning, U.S. Department of Energy Deputy Secretary David Turk presented the keynote address in the Edward J. Pryzbyla University Center’s great room, speaking from the heart without notes to call students to address the challenges of climate change. The keynote was followed by a panel discussion moderated by Jose Aguto, executive director of Catholic Climate Covenant. Panelists included Steven Burke, director of sustainability for Consigli Construction; Craig Cordola, executive vice president and chief operating officer of Ascension Health; Paula Gwynn Grant, secretary for communications for the Archdiocese

of Washington; Kassandra Grimes, Ph.D., ORISE Science, Technology, and Policy Fellow at the U.S. Department of Energy; Robert Simon, Ph.D., independent consultant and advisor on energy, science, and technology issues and principal advisor to the director for energy, transportation, and resources at the White House Office of Science and Technology Policy in the Obama administration; and Tommy Wells, director of the District of Columbia Department of Energy and the Environment. The panelists discussed challenges and opportunities related to climate change in a variety of disciplines and fielded questions from students in the audience.

During the lunch hour attendees and students meandering through the Pryzbyla Center explored an exposition fair featuring green energy and food equity organizations, among others. The rest of the conference occurred as breakout discussions led by community members and students. Participants in the “Food and Water Equity” discussion enjoyed hearing from the staff of Cardinal Cupboard which addresses food insecurity on Catholic University’s campus. The breakout session entitled “Built Environment” prompted enthusiastic dialog between construction industry speakers and civil engineering professors and students. Other breakout topics included politics, law, and national security; science and technology; arts and culture; spirituality and ministry; business; and human health.

Dean John Judge, Ph.D., and Jason Davison, Ph.D., assistant professor of civil and environmental engineering, were among a group of Catholic University faculty, staff, and students who organized the conference. The conference was made possible with the support of Coca-Cola, Consigli, Marsh McLennan, Gilbane, Whiting-Turner, and Moriarty & Associates.

New Faculty and Staff



Dan Gunther joined the School of Engineering in June 2022 as Assistant Dean for Advancement. Prior to joining the School, Gunther served as the Assistant Dean for Advancement at the Busch School of Business from 2020–2022. For seven years prior, he served as Executive Director of Development at Case Western Reserve University’s College of Arts & Sciences during the University’s successful Forward Thinking, \$1.5 billion campaign. Coming to Catholic University after 20+ years in northeast Ohio marked a return to Washington, D.C., for him and his wife, Michele, who met while he was in graduate school up the road and Michele, a speech pathologist, was working at a nearby pediatric hospital. (Fun fact: they got married in St. Anthony’s in Brookland!)



Rebecca Kiriazes, Ph.D., joined the faculty in fall 2022 as assistant professor of civil and environmental engineering. Kiriazes received her Ph.D. in Civil Engineering from the Georgia Institute of Technology in 2022 where her research, supported by the NSF Graduate Research Fellowship program, focused on the shifting attitudes and behaviors toward shared mobility. She received her B.S. in Civil Engineering from the University of Florida. Her research interests include travel behavior and multimodal system planning to promote sustainable and safe urban environments. She is looking forward to promoting the frontiers of transportation engineering through impactful research, to inspiring undergraduate and graduate students to be future leaders, and to serving a diverse student and local community at Catholic University. Kiriazes enjoys cycling (she biked from Pittsburgh to Washington, D.C., last summer!) and playing the carillon (bell tower), which she hopes to continue playing in D.C.



Nathan Neckel, Ph.D. 2008, joined the faculty in the Department of Biomedical Engineering in fall 2021 as a visiting assistant professor. He completed his Ph.D. in biomedical engineering at Catholic University in 2008 and then went on to complete a postdoctoral fellowship in neuroscience at Georgetown University. Upon receiving the prestigious K99/R00 career development award from the NIH, he established his own independent laboratory at Georgetown to investigate the ability of robotic gait training to restore locomotion in a rodent model of spinal cord injury. This led to several innovations and patents in gait analysis techniques, specifically the use of spatial statistics and cluster analysis. He now hopes to apply these findings to humans while at Catholic University’s Center for Applied Biomechanics and Rehabilitation Research.



Martha Rivas, B.B.E. 2018, joined the School of Engineering in March 2022 as the new assistant director for grants management. Rivas is an alumna of the class of 2018 in which she received a degree in Biomedical Engineering. Rivas previously worked at the Patent and Trademark Office where she reviewed and approved patent applications pertaining to medical devices. Rivas is excited to apply the skills she acquired from the Patent Office to grow and develop the research within the School of Engineering. Rivas is a mom of three kids, so when she is not assisting our faculty she enjoys the excitement and adventure of raising a young family!



Liz Schack joined the School of Engineering in spring 2022 as an administrative assistant for the office of the dean. In addition to administrative support and customer service, her role includes assisting with communications for the school by maintaining the website and social media accounts. Schack has a B.A. in Philosophy from St. Mary's College of Maryland. Before joining Catholic University, she worked as a bicycle mechanic at the REI in Rockville, Maryland, where she learned skills that she now puts to use on her own bikes. When she is not on a road ride or bikepacking adventure, she enjoys running with the club she started (NoMa Run Club), playing board games, and cooking vegetarian food. She lives with her partner and cat in Washington, D.C.

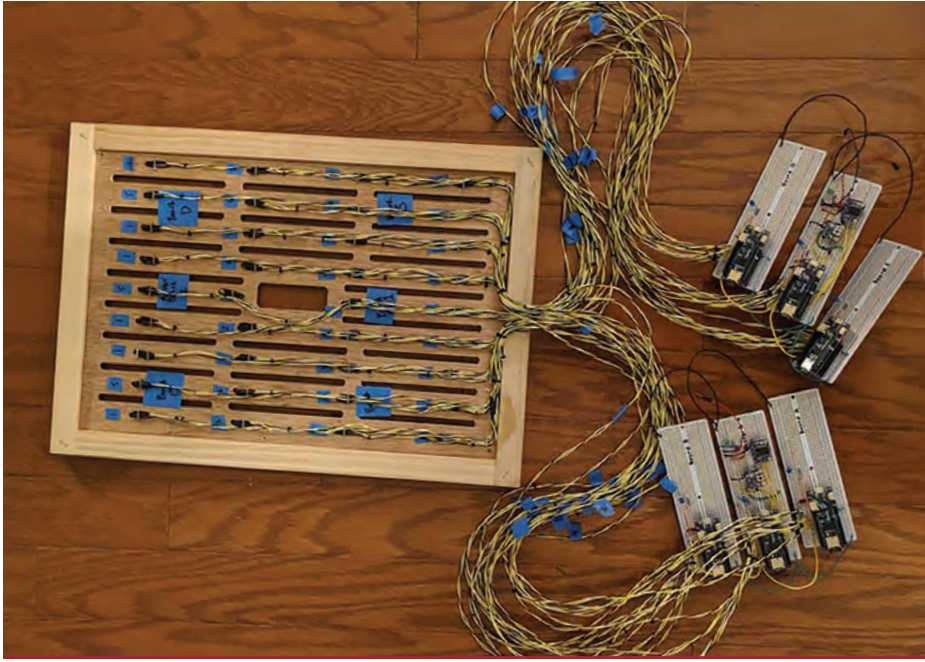
School Leadership Updates

Otto Wilson, Jr., Ph.D., associate professor of biomedical engineering, was appointed chair of the Biomedical Engineering Department in August 2021. Wilson, who joined the faculty in 2003, is an expert in biomaterials and tissue engineering. His research interests include biomineralization phenomena, nanomaterials chemistry, biological liquid crystals, and the synthesis and surface modification of hydroxyapatite. He is also very active in K-12 educational outreach and developing tools and teaching methodologies to encourage young people to excel in STEM education.

Diane Miranda was appointed as assistant dean of the School of Engineering in September 2021. Miranda first joined the staff as assistant to the dean for academic affairs in 2016 and was promoted to coordinator of academic programs in 2018. In her new role of assistant dean, she works closely with the dean, associate deans, and department chairs to manage the academic operations of the school, resolve issues for students and faculty, and coordinate the school's operations with other schools and offices on campus.

Richard C. Thompson Jr., Ph.D., associate professor of practice, was appointed associate dean for professional programs in August 2022. Thompson joined the full-time faculty in the spring 2020 after teaching courses in Engineering Management and Civil Engineering as an adjunct faculty member and consulting on research projects with our faculty for many years. His undergraduate training and first master's degree were in architecture and design, from Arizona State University in Tempe, Ariz., and The New School of Architecture and Design in San Diego, CA, respectively. He also holds an M.B.A. from Cornell University and an M.S. in Engineering Management and Ph.D. in Civil Engineering from The Catholic University of America. Having both taken and taught many courses in our Engineering Management program, he is intimately familiar with that program and well-positioned to take over as its director, one of the several duties of the Associate Dean for Professional Programs. His other duties include helping the School of Engineering continue to expand its outreach to local industry and government, developing and managing educational offerings for our partner organizations and for working professionals more generally.

//OUR STUDENTS



The system designed by students Anna Stumme and Brett Padula consists of a grid of temperature sensors embedded in a wooden panel.

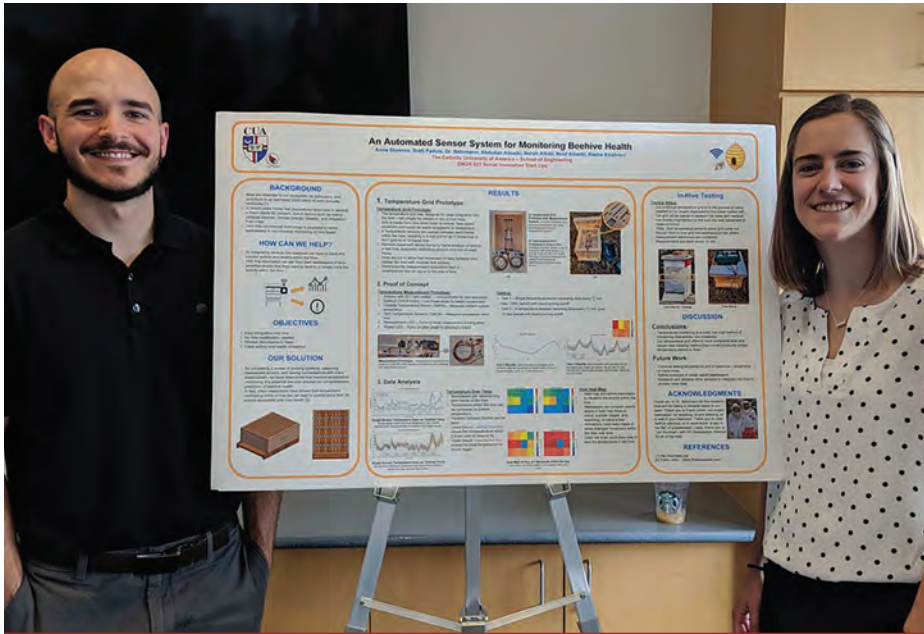


"You get a little nervous when you're gearing up and putting on the suit because the bees are only a few inches away from your eyeballs," said Padula.

Student-Designed Beehive Monitoring System Helps Local Beekeeper

A beehive tracking device designed by Catholic University engineering students has now been in use by a local beekeeper for more than two years. The monitoring system, designed and built by Anna Stumme, B.E.E 2017, M.S. 2019, and Brett Padula, B.M.E 2017, M.S. 2019, was part of a project for the pair's Social Innovations course, taught by Greg Behrmann, clinical associate professor of biomedical engineering, and Chris Danek, part-time associate professor of biomedical engineering and Ciocca Center Fellow. Every year, students in the Social Innovations Course are tasked with building a business plan around a product and reaching out to consumers who would be willing to share their feedback. The goal is to design something user-friendly that will solve a real world problem.

The idea for a project related to beekeeping came from Behrmann, who was interested in beehive monitoring after learning about the dangerous decline in bees around the world.



Padula (left) and Stumme (right) present a poster on their work at University Research Day.

He suggested Stumme and Padula take up the challenge and encouraged them to reach out to the D.C. Beekeepers Association for more guidance.

“I proposed this as a topic with no specific solution — what could we monitor to determine the health of a beehive,” Behrmann said.

Both Stumme and Padula had previously earned their bachelor’s degrees in engineering from CatholicU while also competing as student-athletes. Stumme said she was interested in working on the beehive project because it was something completely new to her.

“I didn’t know much about beekeeping, but it just seemed like an interesting project and something that would give you a very different experience than what you would get in a class,” she said.

The students connected with Frank Linton, a beekeeper who lives in Maryland. Linton was interested in working with the team because of his past career as an artificial intelligence engineer. As a beekeeper, he has been experimenting with various kinds of

sensors and temperature gauges since 2005. He reports on his experiences and those of others at his website colonymonitoring.com.

Linton was interested in learning more about the hive temperature because healthy bees naturally keep their brood at a certain temperature. “You can tell quite a lot from the temperature; you can tell if there is brood or not, and if they’re alive and well,” he said. “If you had a whole array of temperature sensors in the hive, you could tell more about the brood, including how large it is, how much it is growing or shrinking, and where they are in the hive — are they up by the honey or down below?”

The system designed by Stumme and Padula consists of a grid of temperature sensors embedded in a wooden panel. The setup is designed to slide between beehive components and is in place all year long.

One of the big challenges, Behrmann said, was determining the correct dimensions for the system. If the space around the unit was too big, the bees would build honeycomb in it, while if the space was too small, the bees

would block it up.

“We built it in Pangborn and Anna did a lot of the work at home, testing it in her apartment before we deployed it,” Behrmann said.

One of the most interesting parts of the project, according to Padula, was installing the system in person.

“You get a little nervous when you’re gearing up and putting on the suit because the bees are only a few inches from your eyeballs,” he said.

“You’re supposed to stay calm because most animals can sense fear,” Stumme said. “Once you get over that, they’re not going to hurt you.”

The final system — an array of temperature sensors — runs 24 hours a day and records data to an SD card. The students programmed the software and designed the sensor array to be as efficient as possible. Linton checks the sensors every two weeks to collect the data and change the batteries.

“I can see where the brood is, how healthy it is, and how quickly it’s growing or shrinking, and then from the brood you can make inferences about the queen, to determine if she’s doing well or doing poorly,” he said. This past winter, the system was helpful in keeping tabs on how the colony was doing.

“This was really key because starting at the end of February, the queen needs to be laying eggs like crazy to be ready for the dandelions in mid-April,” he said. “We want to make sure they have enough food, that they’re growing and that they’re reaching the brood temperature of 95 degrees.”

While there are other places that sell sensors, Linton believes the one designed by Stumme and Padula might be the best one out there. Linton presented his findings using the sensor system as part of a three-part series in *The American Bee Journal* and an international conference.

“With 36 temperature sensors, it gives a very finely detailed picture of how the hive is doing,” he said.

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Our Students

“With this project, there’s been way more challenges. I’ve done more of the programming for the microcontroller for the temperature sensor. It’s something I wouldn’t have seen myself doing, rolling with the unknown like this.”



Even though they both work full time, Stumme and Padula check on the system a few times a year to make updates and ensure it is still working.

“It really is a groundbreaking system that has the potential to give a lot more detail of what’s going on in a beehive than conventional systems do.”

Even though they both have since graduated and now work full time (Stumme at the Naval Research Laboratory and Padula at the Army Research Laboratory), Stumme and Padula have kept working on the project. They check on the system a few times a year to make updates and ensure that it is still working properly. Stumme, who also is in a doctoral program in electrical engineering at Penn State, says she enjoys being able to work creatively on a project that is so different from her day-to-day work.

“With this project, there’s been way more challenges just having to figure out stuff you don’t really know or aren’t good at,” she said. “I’ve done more of the programming for the microcontroller we use for the temperature sensor, which hasn’t always been my strong suit or what I focused on. It’s something I wouldn’t have seen myself doing, just rolling with the unknown like this.”

Padula said he’s also enjoyed the creative aspect of working with the beehive monitoring system.

“It’s different from what I do at work,” he said. “It’s interesting to see how you might build a project from the ground up.”

Linton said he is impressed and grateful for the way in which Stumme and Padula have stuck with the project.

“I am so grateful for their energy,” he said. “They have work, they have jobs, they’re in grad school and presumably they have a life, and then there’s this project.”

— Katie Bahr

Neilom Foundation Supports Students

For the last two academic years, the School of Engineering has received support from the Neilom Foundation through the Neilom Scholars Program. Named in honor of Neil Anand, the foundation's mission is to develop an active community of young people working together to create significant social impact using technology. Neilom Scholars — undergraduate and graduate university students — receive financial support in the form of internships with nonprofit organizations, university research internships, and competition prizes. In the 2020–2021 academic year, Catholic University Neilom scholars Margaret Moorcones, B.B.E. 2021; Sabrina Geary, B.M.E. 2021; and Elise Parker, B.B.E. 2021, M.S. 2022, organized and led “Design Jam — Vaccinate DC” which focused on equity of COVID-19 vaccinations in the District of Columbia. With the guidance of design, immunization, and healthcare professional ambassadors, participants worked in small groups to pose solutions to the challenges of vaccine misinformation and equitable access to vaccination appointments. The design jam introduced participants to the principles of human-centered design and fostered agile collaboration. In the 2021–2022 academic year, Margaret Brautigan, Elizabeth Caufield, Madison Hughes, Pauline Oteyza, and Ryan Walczak were recognized as Neilom Scholars for their work on a year-long project with Eric Lund, through the Quality of Life Plus Program. Eric Lund, a military veteran, is one of the first recipients of an above-the-elbow, double-arm transplant. He continues to receive follow-up treatment at the Walter Reed Army Medical Center. Golf is one of Eric's therapy methods for regaining use of his hands and arms. Building on work done by a team of seniors in 2019–2020, these sophomore biomedical engineering students developed more than 10 prototypes of a golf-grip assist device for Eric to play more independently. They worked closely with Catholic University Golf Coach Ed Nolan, and arranged for Eric Lund to visit the campus and test devices in the Catholic University Golf Training Center. In addition, the team was invited to give an oral presentation at University Research Day.

Neilom Scholars worked with Eric Lund, military veteran, to develop a grip assist device for golfing.



Armelle Malcomb

Doctoral Student Attends 2021 Dissertation Institute

In 2021, Armelle Malcomb, M.S. 2012, Ph.D. 2022, was selected to participate in the Dissertation Institute (DI) while she was working on her dissertation under the supervision of Gunnar Lucko, Ph.D. Funded by the National Science Foundation and hosted by the University of Texas at Dallas and Virginia Tech, the DI is an interactive workshop for underrepresented doctoral students in engineering. During the DI's virtual sessions, Malcomb was amazed by the encouragement and support she received when sharing the challenges she faced as both a professional and Ph.D. student. The connections she formed with other DI participants provided an accountability circle which, along with sharpened writing skills, helped Malcomb to complete her dissertation, “New Universal Law: Application of Tracy-Widom Theory for Construction Network Schedule Resilience.” Malcomb is currently settling into her new job as an engineer with the U.S. Department of Veterans Affairs before returning to work on the publication of her research findings with Lucko.

Our Students

Architect of the Capitol Co-op

A COOPERATIVE EDUCATION PROGRAM

Chase Dreitlein, a rising mechanical engineering senior, is currently participating in a cooperative education program with the Architect of the Capitol (AOC), located in Washington, D.C. The AOC is responsible for the maintenance,



Chase Dreitlein at the U.S. Capitol

operation, development and preservation of 18.4 million square feet of buildings and more than 570 acres of land throughout Capitol Hill. More than 2,000 AOC employees work in and around every building across the grounds — day and night — in support of Congress, the Supreme Court and the Library of Congress.

Chase is working in the AOC's House Office Buildings jurisdiction part-time during the school year and full-time during the summer, with the potential to become a permanent employee upon graduation.

We reached out to Chase to answer questions about how he was able to take advantage of the AOC's co-op opportunity and how Catholic University prepared him for it.

Why did you decide to apply for a cooperative education program with the Architect of the Capitol?

I decided to apply for the cooperative program with the Architect of the Capitol (AOC) because of the ability to be in the center of history. Working in the Capitol complex, I have the unique experience of witnessing firsthand how our government operates and how projects are approved and funded.

What have you been doing in your co-op?

During my time at AOC, I've had the opportunity to see many different projects, including the challenges of updating and changing work that others have done in the past. I have been a part of several commissioning efforts for new air handler units and the balancing of air pressure in several rooms. I have also had the opportunity to walk through the Cannon Building Renewal project, where the AOC is updating the office building a wing at a time for the House of Representatives. The project is currently approaching the end of Phase 3 and workers are preparing to commission the mechanical systems. I appreciated the chance to see this process in action.

How has Catholic University prepared you for this opportunity?

Catholic's timeline of courses has greatly prepared me for the AOC's co-op program through classes in thermodynamics, fluid

mechanics and heat transfer. The majority of my work is based around being able to determine issues with heating and cooling systems in air handler units and steam pipes. This work is based around the fundamentals of the three classes. Catholic University has given me the building blocks to be able to tackle any problems that arise while on the job.

How did you learn about this opportunity?

I learned about this opportunity by attending a networking event with Catholic University alumni. I signed up for a virtual meet-and-greet with AOC Assistant Superintendent Dan Murphy, with the intention of getting my name out to different companies. In our conversation, Mr. Murphy explained the AOC's co-op program and how it offered a chance to get hands-on experience before graduation. I applied to the program once the AOC posted the job announcement.

Would you recommend participating in a co-op program to other students? Why or why not?

Yes, I would highly recommend the co-op program to all students. In the AOC's co-op program, I've been able to get my hands dirty and learn what it takes to take care of the Capitol complex buildings. I've had the unique experience of working directly on Capitol Hill and seeing history and being a part of it. Co-op programs give you the opportunity to see the real-life problems that can appear during everyday use that a classroom can't simulate. Co-ops show you that what you are learning in the classroom can be applied through basic understanding of the topics.

What has been your biggest takeaway from your time working with the Architect of the Capitol?

The biggest take away from my time working for AOC is the ability to see what it takes to take care of such historic buildings, and the process it takes for projects from beginning to the end. It's been a once-in-a-lifetime experience to be a part of a team that is preserving history.



Christina Brown interned with Balfour Beatty the summer before her senior year.

Student Turns Internship into Post-Graduation Employment

To fulfill the civil engineering program's internship requirement, Christina Brown, B.C.E. 2022, took advantage of a Catholic University career fair to secure a project management internship with an international construction company, Balfour Beatty, the summer before her senior year. Working full time over the summer proved to be a great experience for Christina — among her myriad tasks, she assisted in managing subcontractors, learned new programs, helped incorporate new technology into the jobsite, and worked alongside the project engineers in the LEED certification. Because her summer internship was such a positive experience, Christina decided to continue working as a part-time intern at Balfour Beatty during the school year. Juggling her life as “a full-time student

and working 13 hours a week was a challenge, but I was able to perform well in both my classes and my job,” Christina recounts.

It was during that semester that she received a post-graduation job offer: she started her new job with Balfour Beatty as a project engineer in August. Working on the same site from May 2021 to April 2022 gave Christina the opportunity to form interpersonal relationships. “I learned so many soft skills,” she said. “My critical thinking, public speaking, and communication skills were sharpened. Construction is such a people's industry that it was important for me to make connections in each part of the operation. I will always remember the people I met and the friends I made.”

Doctoral Student Honored for Best Abstract at WEFTEC

Khoa Nam Ngo, Ph.D. 2022, received the Martha Hahn memorial recognition for highest-rated abstract at the 2021 Water Environment Federation's Technical Exhibition and Conference (WEFTEC). Ngo presented an abstract entitled “Improving Clarifier Performance and Capacity through Full-scale Implementation of High-rate Contact Stabilization.” Ngo earned his Ph.D. in May under the supervision of Arash Massoudieh, professor of civil and environmental engineering, and has continued to work at DC Water and Catholic University as a postdoc, studying intensification and resource recovery, process optimization, and process control for enhanced carbon recovery, nutrient removal, settleability, odor mitigation, and data analytics in wastewater treatment. He has also been developing and improving plant-wide process models for the prediction of settleability to accelerate knowledge transfer of new technology into practice.



Nam Ngo continues to work at DC Water.

Grand Challenges Scholars Complete Spring Break Border Awareness Trip

National Academy of Engineering Grand Challenges Scholars Emily Moriarty, Wesley Garnes, and Joseph Peluso traveled to El Paso, Texas, during spring break for a border awareness experience. Students were accompanied by Associate Professor Greg Behrmann, Ph.D. 2009, and Chris Danek, B.M.E 1989, part-time associate professor. Activities included an additive manufacturing workshop at the University of Texas El Paso, visits to cross-border manufacturers, and a tour of Annunciation House, a volunteer organization that supports migrants and refugees at the Texas-Mexico border.

The workshop was held at the university's Keck Center for 3D Innovation, a unique

research facility focused on the use and development of Additive Manufacturing (AM) technologies. The Keck Center occupies over 13,000 square feet of floor space with more than 50 AM systems. The day-long workshop covered a wide variety of AM methods and hands-on training in CAD, reverse engineering, and the operation of AM systems.

The students also met with companies in El Paso that do business with manufacturers in Juárez, Mexico, to gain an understanding of how cross-border manufacturing is structured. Visits included a custom automation systems integrator, injection molding company, and a large medical device manufacturer. The students were also guests of BIO El Paso-Juárez, an organization that works to promote

and enhance the El Paso-Juárez biomedical ecosystem.

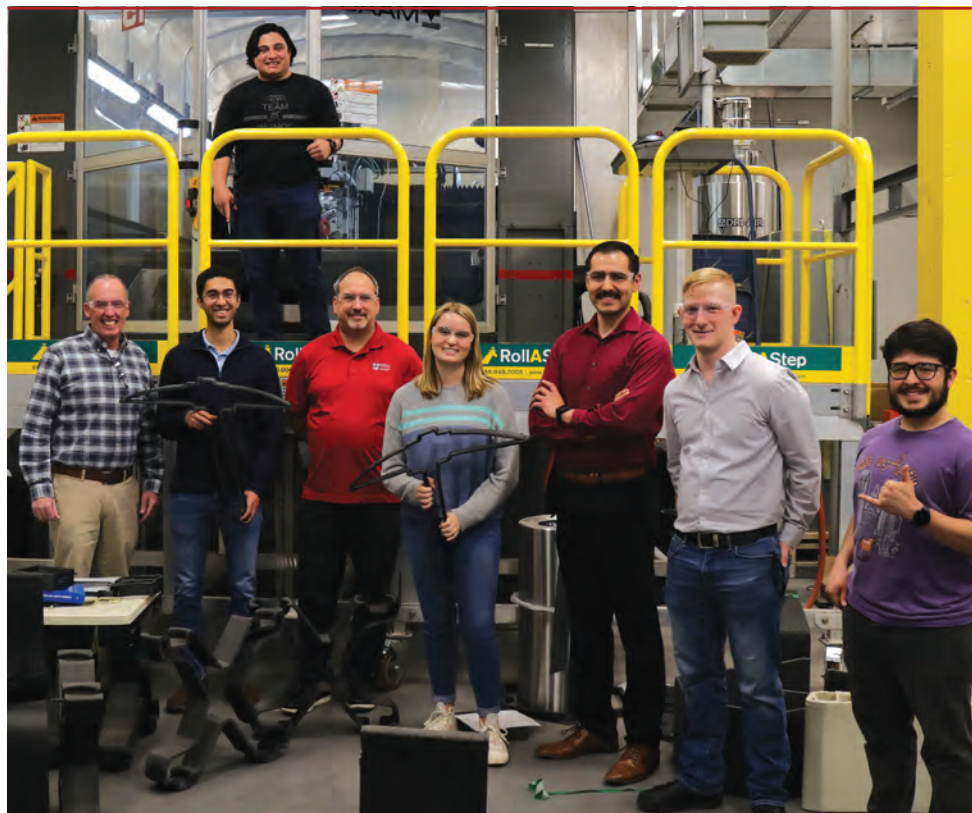
In addition, the students received a special tour of Annunciation House. Rooted in Catholic social teaching, the volunteers at Annunciation House live in community with the guests they serve, who are mostly from Mexico and Central America. Annunciation House also provides advocacy and education around immigration issues.

The National Academy of Engineering Grand Challenges Scholars program (GCSP) is designed to prepare the next generation of students for addressing the grand challenges facing society in this century. The program has been implemented at more than 90 engineering schools around the world.



Pablo Rodriguez, President and CEO of Prod Design and Analysis, Inc., El Paso, speaks with Wesley Garnes, Joseph Peluso, and Emily Moriarty.

Left to right: Gregory Behrmann, Joseph Peluso, Luis Camacho, UTEP graduate student, Chris Danek, Emily Moriarty, Jose Coronel, UTEP Drive AM Program Manager, Wesley Garnes, and Angel Vega, UTEP graduate student.





Student Design Teams Challenged by QL+

Over the past few years, CatholicU engineering students have been involved in a special partnership with the Quality of Life Plus Program (QL+). This program challenges university STEM students to create innovative technology solutions that improve the quality of life for injured veterans and first responders. Student teams are matched with a “challenger” who has a specified need to be able to return to doing the things they love.

To date, students have worked with four challengers with diverse requirements. One challenger would like a “breakaway” prosthetic attachment that will allow him to safely return to mountain biking. A second challenger requires a modified golf grip that would allow him to play more independently. A third is interested in lower limb prosthetics that would allow him to reduce the risk of falling while hiking on difficult terrain. A fourth challenger would like an automated forearm positioning device.

In all cases, the students have developed close relationships with their challengers. They meet with them regularly, often on campus for brainstorming, evaluation of prototypes, and testing. Catholic University’s close proximity to Walter Reed Army Medical Center has made it convenient for students to meet with their challengers and caregivers in person.



Left to right: Matt Toppi, Maureen McGarry, Ally Noccioli, Robbie Gaupp (QL+ Challenger), and Mystee Delgado.



Left to right: Chris Cupo, Ann Vogel, Mariagelica Bermudez Gonzalez, and Ashley Sieber stand behind QL+ Challenger Peter Way.



Recent Ph.D. Receives Small Business Grant

Stroke is the leading cause of long-term disability worldwide, with 14 million new cases each year globally and 800,000 just in the U.S. A massive 62% of these survivors will have impairments of the hand, including the inability to open or close, as well as increased tightness that makes it difficult to live independently. To address this massive unmet need, Rafael Casas, Ph.D. 2022, created SpringWear, which received a Small Business Innovation Research (SBIR) phase I grant in the spring of 2022.

Building off of more than 25 years of research out of the Center for Applied Biomechanics and Rehabilitation Research at The Catholic University of America, SpringWear seeks to develop devices that are affordable, customizable, and can be used outside the clinic for home rehab practice to restore upper extremity function for stroke survivors. “The recent SBIR funding from NIDILRR helps us to translate this work from lab to market in order to address the healthcare gap for stroke survivors,” said Casas.

Our Students

Students Attend Conference at Naval Academy

In early November 2021, the School of Engineering sent four undergraduate students — Marshall Mendoza, Achuna Ofonedu, Ryan Wong, and Thomas Macyko — to the 10th Naval Academy Science and Engineering Conference (NASEC) in Annapolis, Maryland. This year's conference centered around the theme of data science and featured keynote speakers Eric Schmidt, Ph.D., former CEO and executive chairman of Google/Alphabet Inc.; Sethuraman Panchanathan, Ph.D., director of the National Science Foundation; and General John W. (Jay) Raymond, the first Chief of Space Operations. "I learned a lot about the

ethical problems engineers must consider as we develop technologies," said Mendoza. "Most of our discussion revolved around AI and machine learning, such as whether they should be used to screen applicants, give weapon systems autonomy, or to what extent they should be used to replace human labor." Wong recalled discussions of bias in data science, saying, "whether it is on the basis of race, gender or anything else, as our world moves toward using lots of data for tools like machine learning and artificial intelligence, we have to account for our own bias." During the hands-on, small-group work that concluded the conference, Wong's group explored this topic further, devising "a holistic

grading system that would take a student's situation into consideration when determining a grade and predicting future success [and] ... brainstorming possible difficulties with the system." The students relished the opportunity to interact with STEM students from other universities. Mendoza, who presented his senior design project at the conference's poster session, received insightful suggestions, especially from military academy students, since his team's project aimed to restore a wounded Army veteran's quality of life. Wong reflected, "it was great to make friends with top students from great universities around the world!"

Achuna Ofonedu, Ryan Wong, Marshall Mendoza, and Thomas Macyko (left to right) attended the 10th Naval Academy Science and Engineering Conference.





School of Engineering Awards

Student Awards

Dean Charles Cuong Nguyen Leadership Award
Elise Marie Parker (2021), Simone Andrea Fera (2022)

The H.B. Atabek Award
Maureen Elizabeth McGarry (2021), Marshall Dimaunahan Mendoza (2022)

Biomedical Engineering Society Award
Madeline Marguerite Groettum (2021), Regina Coeli Vahey (2022)

American Society of Civil Engineers National Capital Section Award
John Michael Devlin (2021), John Henry Mader and Kimberly Ann McGroary (2022)

Dennis McCahill Award for Service in Civil Engineering
Nicholas Anthony Procino (2021), Aleksandra R. Lajeunesse and Anna Maupin (2022)

Timothy Kao Award for Excellence in Civil Engineering
Krystofer Moreira Dudzinski (2021), Thomas Joseph Macyko (2022)

The George McDuffie Award for Excellence in Electrical Engineering
Nathaniel J. Goonasekeram (2021), Jefferson D. Ascencio (2022)

The John N. Welch Award for Excellence in Computer Science
Catherine Therese Baird (2021), James Strawa (2022)

The C.C. Chang Award for Excellence in Mechanical Engineering
Halle Rene Green (2021), Sarthak Regmi (2022)

American Society of Mechanical Engineers Award
Nelson James Zimmerman (2021), Travis Aaron Duchene (2022)

Ruth Hicks Award for Service in Mechanical Engineering
Taylor Leigh Kuhns (2021), Ryan James Wong (2022)

The Anthony J. Scullen Award
Halle Rene Green & Nelson James Zimmerman (2021), Jefferson D. Ascencio (2022)

The Benjamin T. Rome Award
Maureen Elizabeth McGarry (2021), Marshall Dimaunahan Mendoza and Sarthak Regmi (2022)

Dean's Service Award
Nathaniel J. Goonasekeram (2021), Julia Ann Schlottmann (2022)

Grand Challenges Scholars
Brian O'Malley (2021), Joseph Jonas and Joseph Peluso (2022)

Faculty and Staff Awards

Burns Junior Faculty Fellowship
Chuan-Fu Lin (2021), Minhee Jun and Diego Turo (2022)

Charles H. Kaman Award for Excellence in Research
George Nehmetallah & Sang Wook Lee (2021), Hieu Bui (2022)

Charles H. Kaman Award for Excellence in Teaching
Diego Turo (2021), Gregory Behrmann (2022)

Dean's Faculty Service Award
Jandro Abot (2021), Christopher Raub (2022)

Engineering Staff Excellence Award
Diane Miranda (2021), Renay Serano (2022)

Engineering Part-Time Instructor Award
Jeffrey Hooper (2021), Tommy Gardner and Michelle Bailey (2022)

Student Profile: Jefferson Ascencio

Jefferson Ascencio, B.E.E. 2022, is this year's recipient of the The Anthony J. Scullen Award for the highest grade point average in the School of Engineering, as well as the The George McDuffie Award for Excellence in Electrical Engineering.

Why did you decide to come to Catholic University?

As a first-generation Latino student, I had no idea what to expect from college; college seemed like a mystery box. With so many unknowns before me, I reflected on what was important. I decided to attend Catholic U because it allowed me to merge everything that I love: family and opportunity.

Family — my biggest source of motivation as I embarked on an unmapped, four-year journey. As a D.C. native, I had the opportunity to commute to school, which meant being able to see my family. Although college presided over my schedule, I took great comfort in being able to spend time with my loved ones. At the time of my application, my sister was five years old. I couldn't walk away from the joy of her daily giggles. When things got hard, my mom would end our conversations with the popular saying, “ponte las pilas” (put your batteries on). Although it may sound silly at first glance, the phrase reminded me to stay focused, try my best, and chase after my goals. Those three words fueled me through hard math and abstract concepts presented in class.

Opportunity — the ability to find a job. Catholic University's location is key to many potential internships and entry level positions. With so many industries — defense, consulting, energy, construction, among others — within D.C. and its surrounding areas, I realized that I had a good chance of building a successful network that would ultimately lead me to opportunities. D.C. continuously seeks interns and graduates. Furthermore, Catholic University's Metro system would facilitate my commute. I could get anywhere within minutes, making it great for interviews.

Why study Electrical Engineering?

Well, I didn't know I wanted to study electrical engineering when I first arrived at Catholic University. In fact, I came in as a “Engineering, Undecided” student; I recall debating between civil and electrical.

Eventually, I picked electrical because of my interest in programming and constructing devices. My faculty advisor further assured me that the major encompassed a wide range of skills that could lead me to other opportunities. After four years, I can attest that she was right. Electrical engineering is broad and full of surprises! There is always something new to learn.

Jefferson Ascencio, B.E.E. 2022





“The best part of going through the School of Engineering at Catholic University would be the people.”

Did you learn any life lessons, engineering-related or not, while you were here?

Appreciate the people around you. It’s tough when you’re an engineering student; you spend countless hours studying, doing homework, or reviewing practice problems. Sometimes, it might seem like too much. We become fixated on our own lives, and in the process, we forget about those around us. Just make sure to check in. Enjoy the process! You won’t always be in college.

What were the best parts of your time in the school of engineering? Best classes? Favorite professors?

The best part of going through the School of Engineering at Catholic would be the people — classmates and professors alike. Everyone struggled together and that creates a lot of bonds. The faculty takes pride in caring for their students, although we may not always see eye-to-eye on what’s “fair” on an assignment.

My favorite class would have to be Social Innovations and Electromagnetics. Despite the courses being difficult, they helped me to understand the value of patience and perseverance. Additionally, my work was rarely “perfect,” so I learned to receive and incorporate constructive feedback into my assignments.

On the other hand, I would like to give a special shout-out to Professors Russo, Behrmann, and Picozzi, all of whom taught me a lot in their own way. I also thoroughly enjoyed talking to the TA’s — Chinh Tran and Thuc Phan. Everyone had great advice and it made a difference with job-searching, resume building, etc.

Any other memorable experiences, fun stories, etc?

During my time at Catholic University, I went on two immersion trips—West Virginia and the Dominican Republic. I made a lot of friends and memories on both trips, while learning more about the injustices around the world. I would highly suggest applying to them! They are worth it. Any questions, contact Harrison Hanvey — he’s the man.

What are you up to now? And what will you be moving on to next?

Recently, I have been taking short vacation trips with friends. However, I will soon start as an electrical engineer at the Naval Research Laboratory in Washington, D.C. Not to mention, I plan to continue my graduate studies in electrical engineering at George Washington University in the fall.

Jefferson Ascencio with his family.





Our Students

Congratulations Class of 2021 and 2022!

Doctoral Degrees

2021

Majedah M. Alkharji

Improvements and Applications of Homomorphic Encryption

Ibrahim Almubark

Machine Learning Approaches for Early Detection and Diagnostic Classification of Alzheimer's Disease using Neuropsychological and Cognitive Test Data

Bashayer Y. Alrashed

Damage Identification and Condition Assessment of Steel Girders Under Moving Loads

Huu T. Huynh

Game Theory Application in Construction Project Management

Li-Tse Hsieh

A Reinforcement Learning-based Framework for Resource Allocation and Task Assignment in Mobile Edge Computing Networks

Van Kha Lam

Classification of Cancer Cells Using Digital Holographic Microscopy and Machine Learning to Predict Disease-Relevant Behavior

2022

Rafael Casas

Torque Controlled Exoskeletons for Take-home Upper Limb Rehabilitation

Piao Hu

Tailoring Chitosan Membrane-based Microfluidic Platforms to Tackle Biological Challenges

Armelle Perpetue Malcomb

New Universal Law: Application of Tracy-Widom Theory for Construction Network Schedule Resilience

Khoa Nam Ngo

Developing a path towards improved settleability and model for settling prediction in high-rate contact-stabilization system

Akbar Pirmoz

Computational Modeling of Mechanical and Piezoresistive Response of Carbon Nanotube Yarns

Melissa Sandison

Wearable Rehabilitation Robotics for Upper Limb Stroke Recovery and Examining Electrophysiological Activity During Use

Master of Science, Biomedical Engineering

2021

Mary C. Egwim

Daniel Ennis

Kaelin Martin

Alexander M. Mulyk

Joanna H. Nguyen

Christian E. Obuchowski

Khue N. Phan

Fatma Samkari

Sabrina Juliet Scott

Abdulrahman Sindi

Yousef Sindi

2022

Makayla Czan

Thien-An N Dinh

Timothy Gangemi

Van Khanh Lam

Peter Allan Larsen

Thien Jason Tran

Master of Science, Civil Engineering

2021

Naif Alayyash

Sultan A. Alayyash

Saif Alghoraiyr

Basheer Khalid Almutairi

Mubarak Alnajjar

Mouad E. Alqasiri

Ahmad M. Alqasseri

Abdulelah Ibrahim H. Altherwi

Alyssa Marae A. Santiago

Patrexia Tampon

2022

Aljawhra Khaled Alotaibi

John Devlin

Jonel Pagdanganan

Karol V Triana

Master of Science, Computer Science

2021

Ava Filipour

Michael Jacobs

Han Q. Nguyen

Tien Pham

Loc Phuoc Tran

2022

Mai Phuc Bui

Lan K Nguyen

Thuan Duc Tran

Master of Science, Data Analytics

2021

Fireneger A. Getahun

Rafael Antonio Moreno Contreras

Lauren C. Tigani

2022

Charles Christopher Morrison

Ariunbileg Ravdanpurev

Master of Science, Electrical Engineering

2021

Christopher W. Abadilla

Abdulaziz R. Alazemi

Hamed Alazmi

Ahmad A. Alkhatlan

Murdhi Alrashidi

Salih M. Alshaea

Humoud Alwaaan

Nicholas J. Dutz

Sue Lee Todd

Alana Torres Vidal

2022

Mohammed Alajmy

Faisal Aldousari

Kelthoum J Alhamadi

Meshal H S Alkahlawi

Bader Alshuraia

Ryan William Boslego

Donald Andrew La Haye

Truong Nhac Nguyen

Jacob Sontag

Master of Science, Engineering Management

2021

Mohammed Y. Abu Sharifa

Murtada A. Al Saihati

Bandar A. Al Turki

Faisal Talal A. Alghamdi

Rahaf Alghamdi

Haifa Alghannam

Mansour Alhathni

Mohammed Alkhatami

Mohammad S. Almaghlouth
Mouad E. Alqasiri
Ahmad M. Alqasseri
Shahad Alruwaydhan
Christopher J. Brecken
Curtis Celestine
Hattan Ghazi Halawani
Chris Jarvis
Matthew Kowalski
Abdulaziz A. Shami
Spencer P. Tripp

2022

Hamid Al Bakhat
Abdullah Sultan Aladwani
Abdulhamid Faisal Almadani
Fai Almahmoud
Yasser Alghamdi
Mohammad Alghamdi
Fadhel Alsadeq
Anas Fayez Alshehri
Miguel A Figueroa
Marshall Dimaunahan Mendoza
Christian C. O'Connor
Jesse Randall Rines

Master of Science, Environmental Engineering

2022

Han Q Nguyen

Master of Science, Materials Science and Engineering

2021

Yezena Admasu
Saad S. Alshahrani
Rehab Alshaikhi
Mireille Muhoza
Kristine T. Nguyen

2022

Jaime R Santiago
Starre Nicole Williams

Master of Science, Mechanical Engineering

2021

Mohammed A. Alomair
Nour H. Alsharif
Virginia G. Boras
Mary C. Cain
Maria Z. Galle
Halle R. Green
Shannon Harrington
Binh K. Hoang
Jonathan Kerby
Brennan B. Woo

2022

Nicholas T. Gangemi
Peter Francis Coene
Taylor Kuhns
John Patrick Swift
Willis J. Willoughby
Ryan James Wong
Nelson James Zimmerman

Bachelor of Biomedical Engineering

2021

Van Khanh Lam
Peter Larsen
Lauren C. Tigani
Krista Boretti
Makayla Czan
Mystee Delgado
Siobhan Ferguson
Brianna M. Finoli
Taylor M. Forgen
Timothy P. Gangemi
Madeline M. Groettum

Heather M. Hurley
Ananda M. Jagadesan
Benjamin J. Karthaus
Aris Magoulas
Patricia Martinez Galib
Maureen McGarry
Margaret E. Moorcones
Joanna H. Nguyen
Allysa Nocchioli
Elise M. Parker
Matthew Toppi
Thien J. Tran
Jaime K. Wilkinson

2022

Raghad A. Alahmari
Mohammad Ali Alkazemi
Kathryn Grace Cusumano
Evan Hochstadter
John E. Joyner
Marshall Dimaunahan Mendoza
Christine Motz
Joseph Peluso
Joseph Howard Robben
Reginald H. Taylor-Smith
Gianny Christine Teixeira
Regina Coeli Vahey
Lauren Olivia Zelnik

Bachelor of Civil Engineering

2021

John E. Abbruzzi
Abdullah Al Masad
Saif Alghoraiyr
Mohammad E M A Alshammeri
Kenz A Baryoun
Garret Boyan
Wuseok Choi
Matthew Corinaldesi
John Devlin
Erick D. Garcia
Sarah M. Gattan
Samuel Gawarecki

Sean A. McCormick
Raymond J. Molnar
Taylor T. Obusek
Molly R. O'Connor
Jonel Pagdanganan
Kate L. Parker

2022

Christina Ann Brown
Mitchell Bundschuh
Kyle Jagers
Patrick Joseph Keegan Jr.
Thomas Joseph Macyko
Jason Anthony Martinez
Lauren Anne Roberson
Kimberly Sorto
Hadi Tanyous
David F. Zalcman

Dual Degree, Bachelor of Civil Engineering and Bachelor of Science in Architecture

2021

Curtis Celestine
Christopher D. Johnson
Amanda C. Libasci
Krystofer L. Moreira Dudzinski
Nicholas Procino

2022

Jordan Bryant
Ye-Sook Catherine Srijunthavong
Catalan
Aleksandra R Lajeunesse
John Henry Mader
Anna Maupin
Kimberly Ann McGroary
Julia Ann Schlottmann

continues on the following page



Our Students

Bachelor of Science in Computer Science

2021

Dominic J. Abela
Ogechi V. Anyanwu
Catherine T. Baird
Matthew A. Bechtel
Sarah R. Beretich
Mai P. Bui
Hoang Cao
Christina Ciola
William T. Corrigan
Erin Costello
Nam-Anh Dinh
Andrew D. Larsen
Christopher S. Levano
Bethlhem Mekonnen
Han Q. Nguyen
Kristine T. Nguyen
Tyler R. Shaffer
Robert J. Varadan

2022

Raghad Alghamdi
Robert Charles Clement
John M. Higgs
Owen Michael Jahne
Luke Kelty
Mark Madaras
Brian Achuna Ofonedu
Zachary Dawson Rinehart
James Strawa
Chau Vo

Bachelor of Electrical Engineering

2021

Trieu Hoang Nguyen
Feras Sarour
Mashari Alharbi
Jack Andriani

Matthew Fairbanks
Nathaniel J. Goonasekeram
Christopher T. Le
Zackary Tucker
Ian Winn

2022

Fatma Saleh Alshammari
Jefferson D. Ascencio
Ysenia Henriquez Zepeda
Dorothy O'Connor

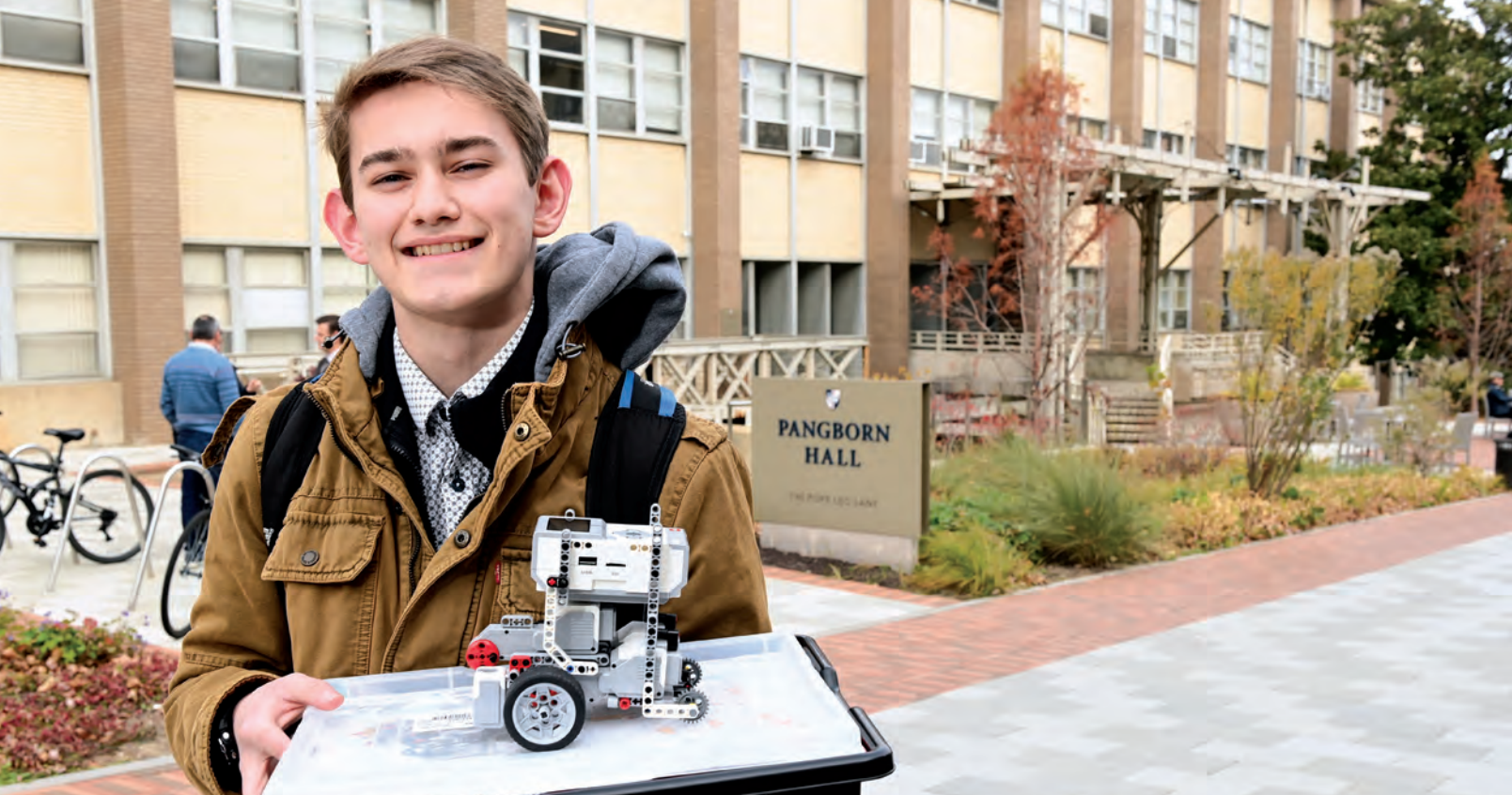
Bachelor of Mechanical Engineering

2021

Ahmed Alnaif
Mohammed A. Alomair
Musaad Aloraini
Yahya Alshehri
Abdullah M. Altassan
Essam Alzahrani
Silvino E. Argentieri
Omar Bayazeid
Turki Bahumayd
Nicholas Battaglia
Stephen P. Cypher
Patrick Fischer
Sabrina L. Geary
Halle R. Green
Christopher J. Grunbok
Mara Herdic
John P. Kenny
Taylor Kuhns
Kendric Musser
Leo A. Nardo
Caleb C. O'Brien
Brian P. O'Malley
Brett A. Para
Eryk Ross
John P. Swift
Kathleen B. Ward
Willis J. Willoughby
Kevin L. Zimmerman
Nelson J. Zimmerman

2022

Suhayb Alharbi
Khaled Alhusaini
Ahmed Mohammed Almuffih
Abdullah Mohammed Almuffih
Abdulrahman Salem Alshammari
Sonia Teresa Bautista
Paul Bello
Cagney Ann Boyle
Peter Francis Coene
Matthew Alexander Crawford
Kieran Doherty
Matthew Joseph D'Ortona III
Travis Aaron Duchene
Dominick Angelo Fedorchak
Simone Andrea Fera
Nicolas Fernandez-San Cristobal
Massimo Nicholas Germinaro
Nicholas Golde
Matthew Burleson Haigwood
Christopher Kiet Zynel Jenkins
Alonso Rodriguez Johnson
Joseph Jonas
Luke Evan LaRosa
Alberto Jose López Gonzalez
Kaitlyn M McDonough
Juliette M. McGuire
Skylar William McLean
Elieser Moreira
Zachary Mueller
Erin Catherine Novak
Sarhthak Regmi
James Patrick Schmalz
Jeffrey Antonio Schrieffer-Flores
Daniel Jacob Taylor
Chedy Sebastian Valdez
Alexander Paul Walters
Ryan James Wong
Christopher John Wysocki



Scholarship Enables First-Generation Student to Achieve Dream of Attending Catholic University

While in high school, John Soria envisioned himself as a mechanical engineering major in college who would one day work in the aerospace industry. In his junior year, he made his first visit to Catholic University, where he fell in love with the picturesque campus and faith-filled community. He learned that at the University he could pursue a bachelor's in mechanical engineering along with a concentration in aerospace engineering.

At first, it appeared that financially the University might be beyond his reach. However, when he received his financial aid package from CatholicU, it included the Andrew and Brooke Reger Family Impact Scholarship, which clinched his decision to attend the school of his dreams. The scholarship funded by Andrew, B.A. 1999, and Brooke, B.A. 2001, is renewable.

Now a sophomore in the School of Engineering, Soria says, "When I saw that it was going to work out, I went outside and yelled, 'that's great!' This has had a huge impact on my life."

During his time at Catholic University, Soria, of Hathaway Pines, Calif., says he hopes to land an internship with NASA or a division of Boeing, the world's largest aerospace company whose government operations office is located in Arlington, Va., about seven miles from the University's D.C. campus.

Soria says that he enjoyed his first-semester courses, especially Introduction to Engineering Design and Professionalism, a required course for all first-year students co-taught by Dean John Judge and Jandro Abot, an associate professor of mechanical engineering.

During the first week of the fall 2021 semester, Soria — one of seven children and among the first of his siblings to attend college — says the reality of his situation "really set in. A couple of years ago, I was just another kid on the other side of the country. Now I'm actually a student at CatholicU."

A member of Redefined — a Campus Ministry student group that works with Washington, D.C., area schools and parishes to explore and promote the application of Church teaching on human sexuality to everyday life — Soria is thinking about joining the University Orchestra as a violinist.

As the child of parents who did not have the opportunity to earn college degrees, Soria participated in CatholicU's Take Flight orientation, which supports the transition of first-generation students to life at the University.

"You really can take flight at CatholicU," says Soria.

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