Edmund T. Pratt Jr. School of Engineering at Duke University | 2021

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INSIDE:

The New Wilkinson Building Opens
Using CRISPR to Explore the Dark Genome
Privacy and Versatility in Machine Learning
New Master's Program in Financial Technology

EDUCATION

COVER PHOTOS: *Opened for classes in January 2021, the 150,000-square-foot Wilkinson Building sits at the intersection of the Schools of Engineering, Medicine and Arts & Sciences just steps from Duke's historic West Campus. The building is named in honor of longtime supporters Jerry C. (E'67) and Beverly A. Wilkinson and their family.*

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dukengineer

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FROM THE DEAN

As I write this letter in March 2021, a full year after the pandemic began making major changes to all of our lives, I can't imagine being more proud of how Duke Engineering has handled this year like no other. When the challenges arose, our students, faculty and staff rose to them with the enthusiasm, ingenuity and dedication that makes this school so special.

We used existing collaborations among engineering departments and Duke's medical and nursing schools to launch the COVID Engineering Response Team (page 12), which instituted a rapid but rigorous design process to engineer devices such as improved face shields, isolation tents for patient beds and modifications for common equipment to protect first-line responders worldwide. Student leaders banded together with our new Engineering Entrepreneurship (EngEn, page 40) team to find new virtual opportunities for summer internships (page 26). We created lab kits and shipped them to students around the world to ensure they could still participate in the hands-on courses that define our undergraduate curriculum (page 18). And for those who were able to return to campus in person, our student clubs and teams rearranged workspaces and schedules to safely continue their inspirational projects.

While I marvel and rejoice in our community's resourcefulness and commitment to education and each other in the face of such rare adversity, it is also a bittersweet moment for me as this will be my final Dean's Letter in the *DukEngineer Magazine*. As many of you have heard by now, I have accepted the opportunity to serve Emory University as their next Provost and Executive Vice President starting July 1, 2021. The past five years serving as the Vinik Dean of the Pratt School of Engineering has been an honor and a joy, and I believe the school is in a prime position to continue its incredible upward trajectory.

This January, we opened the new **Wilkinson Building** for student classes (page 6)—a beautiful facility that includes the first specially designed active-learning classrooms on campus, and expands our student learning space by 50 percent. Our faculty has not only grown in numbers while maintaining our leadership in signature areas such as Aeroelasticity (page 34), but new awards for research have increased by 30 percent to a record $97 million last year. A testament to our ability to recruit outstanding teachers and researchers can be found in the hiring of biomedical engineer/entrepreneur extraordinaire Cameron McIntyre (page 12) and expert in smart materials and wearable devices Xiaoyue Ni (page 30), to name just a few.

We have reimagined our undergraduate experience, including introducing our signature First-Year Design course and new programs in engineering entrepreneurship and ethics, purpose and meaning. We have also maintained innovative options that provide flexibility such as our IDEAS Program (page 46), which provides students a path for creating their own unique major.

There is still much to do, of course. Our work against systemic racism, efforts to build community and an inclusive culture, and the cause of student, staff and faculty well-being, especially as we emerge from the COVID pandemic, must carry on strong. I'm confident that we are heading in the correct direction and having some of the tough conversations that must take place, and am especially encouraged by the proactive leadership I have seen through events such as our student-led ***Engineering While Black*** program (page 10).

Duke Engineering owes its present strength to everyone who has contributed to our vision over the years, and its future is particularly bright thanks to our incredible faculty, staff, parents and alumni, and most of all our amazing students.

Provost Sally Kornbluth, who is a staunch advocate for Pratt and our vision, has made plans to ensure that our strong momentum continues throughout this transition. She has appointed longtime ECE professor and Senior Associate Dean Jeff Glass as Pratt's interim dean while launching a national search for the next Vinik Dean of Engineering.

Needless to say, both my wife, Lalita, and I will miss Duke very much. Duke is family, and Duke and Durham will always be a part of our lives—we are fellow Duke parents whose son is a current senior, after all! But Duke is "in" us more deeply; it is a very hard place to leave because it is a good place in the true sense of the word—its people and its spirit are committed to making the world a better place. I will truly miss being a day-to-day part of this vibrant community.

Duke Engineering is not about individuals, however; we have a shared culture of success, of rising higher, of outrageous ambition that will undoubtedly persist on the foundation we've collectively laid over the past few years. None of what we've achieved would have been possible without the incredible talent and vision already here. Duke Engineering owes its present strength to everyone who has contributed to our vision over the years, and its future is particularly bright thanks to our incredible faculty, staff, parents and alumni, and most of all our amazing students.

My profound thanks to all of you for supporting our journey—we would not be where we are without your belief in Duke and its vision and energy. Like you, I will always be a part of the Duke family, both as a Duke parent, and as one who will always be first to wish our students, and our beloved Duke, nothing but soaring success.

Ravi V. Bellamkonda
Vinik Dean of Engineering

EDITORIAL TEAM

EDITOR-IN-CHIEF

Mary Gooneratne is a senior concluding studies in electrical and computer engineering and computer science. At Duke, she's actively involved with the Duke Applied Machine Learning Group, the Baldwin Scholars program, and the DTech scholars program. She's grateful for the way in which Pratt has foster her love for technology and innovation. Outside of the classroom she loves to run and read.

Ace Abdulrahman is a first-year international student considering BME/ECE. He is interested in studying the brain and seeks research opportunities in neurobiology. On campus, Ace is also involved with Blackwell-Randolph House Council, AMA club and research in the School of Medicine. In his leisure, he enjoys playing soccer, practicing calisthenics and journaling.

Woodley Burrow is a junior from Houston, Texas studying mechanical engineering.

Katie Cobb is a junior from Olney, Maryland studying ME with a certificate in Energy and the Environment. She is passionate about renewable energy engineering and sustainability.

Anna Demelo is a freshman from Charlotte, North Carolina. She intends to major in biomedical engineering. On campus, Anna is involved in the Duke Catholic Center, DEID and The Muse.

Shreyas Hegde is a PhD student in the Aeroelasticity lab advised by Prof. Bob Kielb. His research is in the area of unsteady aerodynamics and aeromechanics of aircraft engines. He is an aviation enthusiast and intends to pursue a career in that field. Apart from his research, Shreyas is a part of several on-campus organizations in various leadership roles including the Duke Hyperloop team and the GPSC. During his free time he mostly reads business news related to the aviation industry.

Sunggun Lee is a freshman from Boise, Idaho studying biomedical engineering. He is interested in developing models and systems for medical purposes. Sunggun is also involved in Duke Engineers for International Development, Engineering World Health, and Duke Cru. In his free time he likes to play soccer, listen and play music, and spend time with his family.

Will Rawlings is a junior studying mechanical engineering and earth/ocean sciences. He is interested in the renewable energy industry and hopes to help in the fight against climate change. Will is also on the editorial board for Duke's Independent Film Festival and on the executive team of Audacity Labs, a non-profit founded by Duke students to expose high schoolers to technology and entrepreneurship skills. In his free time, he enjoys playing sports, film photography and hiking.

Luke Truitt is a senior graduating with degrees in ECE, economics and CS. He's from St. Cloud, MN, is a Scorpio, and generally enjoys long walks on beaches. At Duke, he helps lead the Duke Speech Team and the Duke Applied Machine Learning Group. He's interested in artificial intelligence, behavioral economics, financial technologies and the religious development of the Southwest United States. He spends most of his time outside of work with his pet rat, Jakoby, who turned one on January 12, 2021.

Garrett McKeown Wessler is a fifth-year PhD candidate in the Thomas Lord Department of Mechanical Engineering and Materials Science. He works in David Mitzi's lab and his research focuses on the discovery and development of new and complex materials for energy applications. Garrett spends his free time exploring Durham and hiking with his wife and dog.

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Emma Steadman

For years, Engineering Student Government's mission has been to enrich the lives of our engineering student body. In a time of such uncertainty, we aim to support students socially and academically even more than ever before. This year has not been easy, but every day I am impressed by the resilience of my peers and look forward to when we can all gather again on the Harrington Quad or in our beautiful new Wilkinson Building.

Duke Engineering students have had to navigate a shift to virtual labs, online office hours, remote internships and Zoom meetings for group projects. Pratt student groups have found creative ways to remain engaged this semester, through guest speakers and skills workshops offered online. Fortunately, Pratt clubs secured permission to reserve design spaces to continue projects—with proper masking and social distancing—thanks to an understanding that engineering projects require in-person collaboration.

Similarly, many ESG events are based around building community through social events, so navigating the shift to virtual activities was certainly a challenge. We had to say goodbye to our iconic E-Ball and E-Picnics, and there were no weekly Friday hangouts at Twinnies for E-Socials. We started hosting virtual E-socials (e-E-socials) with some student groups and companies. Because of Zoom fatigue, virtual event participation is not on pace with our prior bustling E-socials, yet we were thrilled when just one student showed up to our "Meet ESG" E-social. Forming a connection with even one new student is so important at this time.

"Pratt student groups have found creative ways to remain engaged this semester, through guest speakers and skills workshops offered online."

After a racial reckoning this past summer, ESG recognized its responsibility as leaders in the Pratt School of Engineering to speak up about injustice in the field of engineering. We teamed up with Duke's chapters of the National Society of Black Engineers, Society of Women Engineers and Society of Hispanic Professional Engineers to host *Engineering While Black*, a week dedicated to raising awareness about racial inequalities and funds toward supporting minorities in STEM. Together we hosted Zoom webinars with local foundations dedicated to racial justice work and with professors and professionals of color in the field of engineering. Later in the semester, we invited Pratt students to join the members of ESG in a Race 101 workshop hosted by the Center for Multicultural Affairs. Following these conversations, ESG added a requirement for Pratt clubs to demonstrate their own commitment to diversity and inclusion during their funding proposals. I would like to thank seniors Alexa Tannenbaum and Matthew Jaynes for their diligent work in planning this event.

In the year ahead, ESG looks forward to welcoming everyone back to our regularly scheduled programming of live and in-person E-Ball and E-Picnics. Moreover, we are committed to working toward a more inclusive engineering community at Duke and beyond.

Emma Steadman
ESG President

Jake Ulrich

One of the main reasons why I decided to attend Duke was the Pratt graduate student community. At most of my other school visits, recruitments were department-only events, where I only got to speak with other prospective and current graduate students in civil and environmental engineering programs. However, on my Duke visit, I was able to talk with students interested in machine learning, air pollution chemistry, biomechanics, tissue engineering and various other research areas outside of my specialty. I was immersed in the Pratt student community where department boundaries didn't dictate your social circle. Duke really made an effort for me to meet students across all of Pratt, instead keeping me in a silo. This was just my first encounter with the graduate student community here at Duke.

Once on campus, I saw that these gatherings of all of Pratt were not just for recruitment, but a common occurrence. I saw during my first year that the Engineering Graduate Student Council (EGSC) was one of the main facilitators for this sense of community among our students. I've been lucky enough to be serving my third year on the EGSC board with stints as CEE rep/diversity and inclusion rep (2018-2019), vice president (2019-2020), and now president (2020-2021). Being a part of EGSC has been one of the highlights of my time here at Duke; helping to organize Pratt tents for Campout, watching Duke vs. UNC at the Krafthouse, volunteering with the Food Bank of Central and Eastern North Carolina, our annual Envisioning the Invisible Contest, cornhole tournaments, our weekly Pratt Chats, and so much more. I was ecstatic to help to grow this organization as president this past year and help our community grow stronger and more cohesive. But then COVID-19 hit the United States.

I was not expecting my tenure as EGSC president to involve a global pandemic shutting down campus for months and isolating the Pratt graduate student community from one another. EGSC's number-one priority became keeping our graduate student community, as well as the greater Duke and Durham community, as safe as possible. This meant stopping all in-person programming and adhering to all CDC and Duke health and safety guidelines. However, to try and cultivate that sense of community that makes Pratt so unique, we began switching our programming to Zoom and online-based activities. From virtual happy hours to game nights to trivia, we've been doing our best to stay connected to the Duke community during these difficult times.

One of our most successful events was a First-Year Virtual Mixer, where we split groups of first-year students into various groups with senior graduate students to fill out Social Distancing Bingo Cards. It was a great opportunity for first-years to meet other students, while also interacting with more senior graduate students. EGSC was also successful at advocating for graduate students to have access to online programming from Duke Recreation & Physical Education. We felt that it was extremely pertinent to not cut graduate students off from resources promoting physical well-being during an extremely stressful and difficult time. We were able to then have the Graduate School instate online recreation memberships for all graduate students who wanted one. EGSC is still committed to advocating for our students even through these unprecedented times.

As the year continues, we're trying to ramp up our online programming as COVID-19 persists. We planned a virtual cooking class for snacks to serve at your stay-at-home Super Bowl viewing, and plan on continuing virtual happy hours and game nights. We also hope to increase our outreach to the Durham community in a safe and socially distant way. For recruiting, we still want to demonstrate the strong sense of community here at Pratt by having office hours with EGSC board members to talk all things Duke. All of this would not be possible without the amazing 2020-2021 Board:

Kat Horvath, Vice-President
Ellery Jones, Diversity and Inclusion
Shanmanthi Manoharan, Communications Director
Shreyas Hedge, Treasurer
Karsten Pouslen, MEMS
Mitchell Abrams, BME Rep
Andrew Middleton, CEE Rep
Brittani Carroll, ECE Rep

This team has been incredible during these challenging times. Having to adapt based on the ever-changing situation has not been easy, and I cannot be more grateful for their hard work and dedication. EGSC hopes to return to in-person activities once it is safe to do so, and we can't wait to experience that great in-person community we miss so much. Until we can enjoy a drink on Harrington Quad on a Friday evening, stay safe!

Jake Ulrich
EGSC President

150,000 sqf

35 lab modules

50 offices

170 graduate work stations

200 seat auditorium

The Wilkinson Building

Reimagining Engineering Education

When students returned to campus in January 2021, they were welcomed with 150,000 square feet worth of new and exciting opportunities

With the Spring 2021 semester comes a new addition to the Duke community. The Wilkinson Building, at 150,000 gross square feet, opened for classes for the first time in January 2021.

With two floors dedicated entirely to active student learning, the teaching and design laboratories have been specially created to foster student engagement and hands-on learning. These floors also contain specialized educational centers focused on innovation & entrepreneurship, along with a 200-seat auditorium and a Learning Commons aimed at enriching the student experience. The next three floors in the building house "research neighborhoods" that focus on health innovation, computing and intelligent systems, and environmental health. Equipped with 35 lab modules, over 170 graduate student workstations and over 50 offices, the research facilities at Wilkinson pave the way for increasing collaborative opportunities for researchers across campus.

Jim Ruth, associate dean and director of development for Duke Engineering, believes that the Wilkinson Building will revolutionize engineering education at Duke. "I think it is going to be difficult to imagine what Duke Engineering was like before this building," he says. "It will transform the student experience in an extremely meaningful way on multiple levels."

The Wilkinson Building is named to honor the lifetime philanthropic and service contributions of Jerry C. (E'67) and Beverly A. Wilkinson and their family. Take a virtual tour at ***pratt.duke.edu/wilkinson21.***

Ruth details how student learning space for the school has been increased by 50 percent, with teaching spaces designed to be open and flexible, conducive to a flipped classroom approach and other non-conventional lecture methods. "Another great thing about the building is its location," he explains. Located at the nexus of Duke Engineering, medicine, and arts and sciences, the Wilkinson Building will "bring engineering closer to Trinity and to the rest of the Duke community, while continuing to grey the lines between engineering and non-engineering," Ruth says.

The process behind designing the Wilkinson Building was extensive. An idea conceived almost 10 years ago, plans for the building continued to take shape based on the evolving needs of engineering education. Throughout the process, the student body and faculty were consulted, along with models at other universities.

"We really tried to look at not the history of engineering, but how we wanted students to be able to learn and how students told us they wanted to be able to learn moving forward," says Ruth.

"The idea is to have a place that encourages engineers to focus just as much on art, ethics or culture, as they do on the technical side of things."

ABOVE: While adhering to safety standards set by Duke, students were able to work in the Wilkinson Building's new state-of-the-art labs and meeting spaces for the first time this year.

This led to the creation of not just active-learning classrooms, but active-learning auditoriums. These are structured to allow students to have enough space for group discussions and interactions, irrespective of class size. "It is incredibly rare to have a space where you can fit 200 people but still have the space for students to comfortably turn around and work in smaller groups," adds Ruth.

Another exciting aspect of this building is the unique art collection that it will showcase. Mitchell Vann, director of facilities for Duke Engineering, was instrumental in forming a committee dedicated to selecting artwork for the building.

"There is a real focus on all kinds of art, in fact, the building hosts the first hologram on campus," says Ruth.

The vision behind creating these spaces was to defy the notions of a stereotypical engineering classroom and to construct a more holistic environment, where the definition of an engineer can become more fluid. "The idea is to have a place that encourages engineers to focus just as much on art, ethics or culture, as they do on the technical side of things," says Ruth.

As students gear up to take on new courses and challenges, the Wilkinson Building will undoubtedly play a vital role in reshaping the student learning experience at Duke. For engineers and non-engineers alike, an exciting experience awaits. ■

Ria Thimmaiahgari is a junior majoring in biomedical engineering and computer science.

FROM LEFT TO RIGHT: *Nicki Washington, Shani Daily, Adrienne Stiff-Roberts, Sophia Santillan*

Uplifting, Educating and Listening:

It's Not Over

"Engineering While Black" creates a series of important conversations produced by ESG, NSBE, SWE, and SHPE

2020 has become a year to call for change and unite more than ever before. The horrifying murders of Ahmaud Arbery, George Floyd, Breonna Taylor and many other precious lives have amplified the injustices that Black people face every day—even within our Duke community. The Black Lives Matter movement developed from those determined to eradicate and oppose the continuous violence and injustice inflicted upon Black communities. This movement affirms the talent of Black creativity and innovation and strives for a world where Black individuals' contributions to society are equally valued.

The biggest takeaway from the "Engineering While Black" conversations is that racial inequity in STEM is real and this movement is far from being over.

In order to raise awareness about racial inequities in STEM, Pratt student leaders from the Engineering Student Government (ESG), National Society of Black Engineers (NSBE), Society of Women Engineers (SWE) and the Society of Hispanic Professional Engineers (SHPE) collaborated with the help of the Pratt administration to develop a program known as "Engineering While Black."

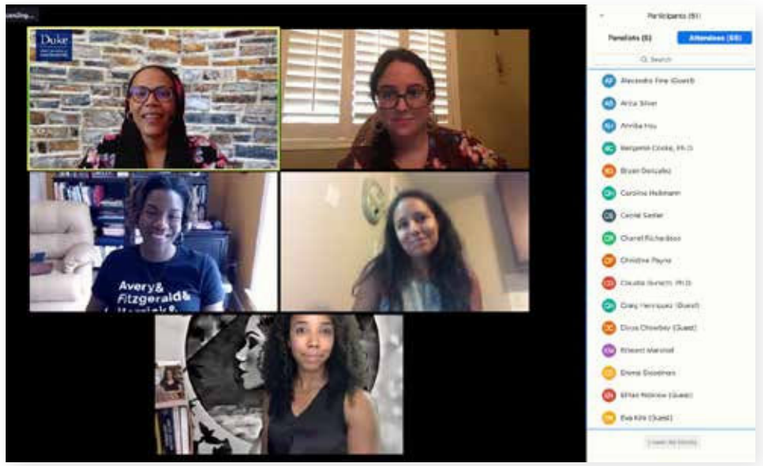
Each Pratt group sponsored a day within the week of August 24 to host a specific local charity run by underrepresented groups to give back to the Durham community. This is especially relevant when, according to an article in the *Indy Week* by Sarah Willets, Durham's community in 2018 was 38% Black and 13% Hispanic and Latino, which are numbers that are not reflected in Duke Engineering's community. On Monday, Duke NSBE sponsored raising funds for SpiritHouse, whose purpose is to create and develop programs to support the transformation and empowerment of Black communities impacted by poverty, racism, criminalization and gender-inequity in North Carolina, centralized in Durham. On Tuesday, Duke ESG sponsored raising funds for Techies4Tomorrow, whose goal is to improve the academic preparation of young Black students and motivate them to succeed in STEM subjects and their future careers. On Wednesday, Duke SHPE sponsored raising funds for Durham For All, whose aim is to bring together a multiracial group of organizers and activists that work to have a government led by people of color and working-class people to ultimately build a cross-cultural Durham.

There were also four hosted talks via Zoom as part of the "Engineering While Black" series. On Tuesday, ESG hosted a discussion with representatives from Durham Colored Library's Techies4Tomorrow about their organization and ways to volunteer with them. On Thursday, Duke SWE hosted Ashley Vassel, technical program manager for Fastly, as she led a conversation on her experiences as a woman of color in engineering. On Friday, there were two perspective conversations on identity and inequities in STEM with Pratt faculty and professional alumni. The first was a faculty panel featuring faculty women of color including Sophia Santillan, assistant professor of the practice of mechanical engineering and materials science; Shani B. Daily, associate professor of the practice of electrical and computer engineering and computer science; Adrienne Stiff-Roberts, the Jeffrey N. Vinik Professor of Electrical and Computer Engineering; and Nicki Washington, professor of the practice of computer science. The second was a professional alumni conversation featuring Stephanie Gloster E'96, lead data architect for Augusta University Health; Damian Dolland E'96, CEO of The Darisami Group; and Clifton Ray E'13, senior scientist at ZenBio.

The biggest takeaway from the "Engineering While Black" conversations is that racial inequity in STEM is real and this movement is far from being over. It was not some 2020 fad. It is not over now because Duke Engineering is hiring a new director of diversity and inclusion or because there are now slightly more people of color around Duke's hallways from recruitment. These conversations in Pratt have made clear that we must work on uplifting, educating and listening.

We must uplift and support our Black colleagues, communities and the Black Lives Matter movement. We can support them by donating to these communities and promoting Black businesses. Most importantly, we must support our Black classmates and groups in Pratt, our Black faculty, and NSBE.

One thing is clear: We cannot continue on the same road in academia and STEM that we have been following. Real change needs to be made and it is not going to happen overnight. It needs to come from all angles. It needs to come from administration hiring more faculty of color and companies having leaders from POC and women. It needs to come from students respecting and educating themselves and realizing that any mistakes they have made in the past regarding discrimination or racial bias will continue to occur. It comes from us supporting one another and uplifting this movement, because "Engineering While Black" awareness should not be for just one weekend. It needs to be a conscious effort that is made every day to make a change. ■



A screenshot from the Faculty Panel on Inequities in STEM, featuring Adrienne Stiff-Roberts (top left), Joana Marie Sipe (top right), Nicki Washington (middle left), Sophia Santillan (middle right), and Shani B. Daily (bottom).

We must educate ourselves. People tend to turn their heads from the situation with the excuse that if they do not know something is happening, they do not have the obligation to help fix it. Do not expect that it is the responsibility of other POC or your POC colleagues to take their time to educate you. Look at educational websites and organizations—the Duke Office for Institutional Equity Resources has a collection of resources—join book and discussion clubs within your departments or Pratt/Duke organizations, and attend seminars or conversations hosted throughout the year.

We must listen. We must not speak on behalf of our Black colleagues. We must listen when they want to talk about their experiences and believe them. We must listen to experts in their fields studying these matters and strive to make change happen.

Joana Sipe is an environmental engineer who is a fifth-year PhD student studying microplastics, nanomaterials and plastic pollution from consumer products. She is advised by Professor Mark Wiesner.

RESOURCES:

Letter penned by a black university student:
https://tinyurl.com/cz3mssye

How to be an ally:
https://guidetoallyship.com/

Duke Office for Institutional Equity Resources:
ttps://oie.duke.edu/node/536/

Duke NSBE resources:
https://linktr.ee/wematterdukensbe

HIGHLIGHTED ORGANIZATIONS IN DURHAM:

SpiritHouse:
https://www.spirithouse-nc.org/

Techies4Tomorrow:
https://www.durhamcl.org/stem-learning-tool

Durham For All:
https://durhamforall.org/about/who-we-are/

Innovation Amidst a Pandemic

A glimpse into Duke's COVID-19 Engineering Response Team

Volunteers help assemble face shields produced through the COVID-19 Engineering Response Team. From the months of May to October, approximately 95,000 face shields were manufactured for use throughout the Duke Health System.

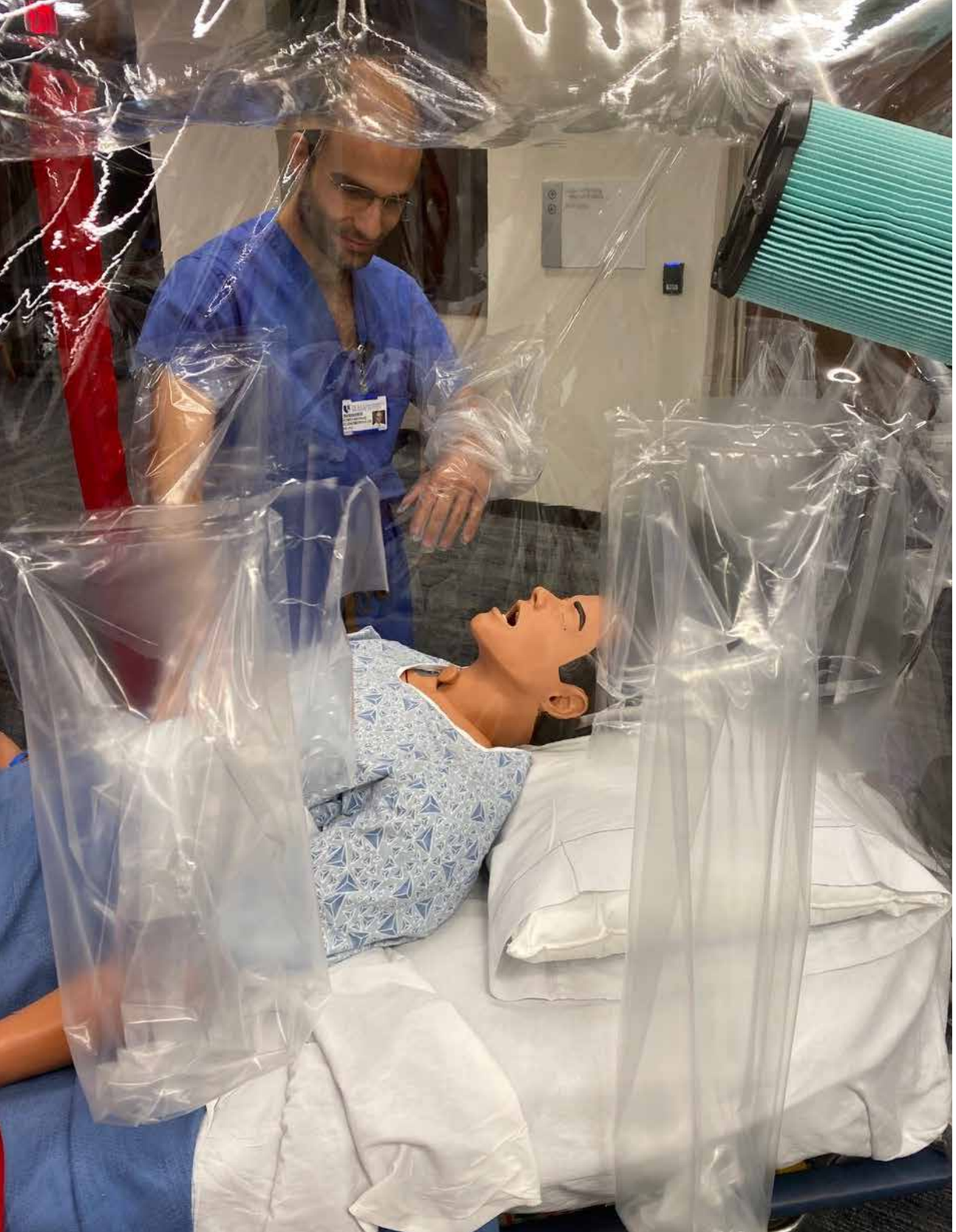
When the COVID-19 pandemic erupted in the United States in early March 2020, it brought overwhelming fear that blanketed the country's health care system. With all of the unknowns surrounding this highly infectious and dangerous disease, health care professionals and their systems were apprehensive not only of treating COVID-19 patients, but also of keeping their personnel safe in the meantime. Shortages of personal protective equipment (PPE) exponentially increased caregivers' anxiety, leading them to seek creative solutions from their community.

Duke University Health System (DUHS) was not immune to these anxieties. As DUHS braced for the predicted influx of COVID-19 patients, concerns over equipment supplies drove clinicians to turn to colleagues in the Pratt School of Engineering for assistance. As the pandemic continued to ramp up, leaders across Duke University and Duke Health joined together to form the COVID-19 Engineering Response Team. Eager to combat COVID-19, they shared device design expertise and innovative solutions.

Spearheading this campaign from the biomedical engineering department were Eric Richardson, professor of the practice of biomedical engineering; Paul Fearis, senior lecturing fellow in biomedical engineering; and Mark Palmeri, professor of the practice of biomedical engineering. Commenting on the reason for the team's formation, Palmeri said, "If you're watching another ship sink in the ocean due to a carpenter ant that could also be eating your ship, you do everything you can to make sure your ship doesn't go down."

Also leading the group were Chip Bobbert, the senior engineer and fabrication architect at Duke's Innovation Co-Lab. Additional support came from Ann Saterbak, director of the Duke Engineering First-Year Experience, who coordinated undergraduate participation; Joe Knight, an adjunct engineering professor with Duke Design Health; Ken Gall, associate dean for entrepreneurship at Duke Engineering; and other members from Duke Engineering and the Innovation Co-Lab.

On the clinical side, Donna Crenshaw, executive



director of MEDx, served as a liaison between Duke Health and the COVID-19 Engineering Response Team, receiving various requests and funneling them to the appropriate team members. Clinicians from Duke Health, including orthopedic spine surgeon Melissa Erickson and Ryan J. Shaw, associate professor and the Elizabeth C. Clipp Term Chair of Nursing, served as key participants in the development of solutions and their incorporation in the Duke Health system.

As the project began, the Engineering Response Team made the difficult decision to emphasize the needs of DUHS as opposed to the health system worldwide. The needs of the Durham community differed from those worldwide, particularly because ventilator shortage was not a concern in the DUHS. Richardson explained that realizing they would be more impactful by focusing on Duke Health first, the team pursued critical needs beyond ventilators.

Any student familiar with the engineering design process taught at Duke by the professors leading this team will recognize the first step taken: needs-finding. Rigorous research and discussion with clinicians at Duke Health informed the team members as to which needs should be pursued first. In determining these needs, the team also narrowed down the exact specifications that the solutions must meet to be successful.

With needs in hand, about a dozen projects were created with separate teams designated to tackle each specific area. Each team focused on various concerns within DUHS, many aiming to properly protect caregivers from disease transmission through airborne infectious particles or contact transmission. The teams were created by pairing the faculty members and clinical leads with undergraduate and graduate students who could provide additional workhours and support.

High quality work is expected from any Duke endeavor, and despite the quick developments in the team's various projects ,Richardson, Palmeri and Bobbert stressed that creating quality devices was never sacrificed at the expense of getting things done quickly.

Implementing any new device into the health system without properly testing it can result in harm to either the providers or patients. To remedy this, Palmeri took it upon himself to develop rigorous testing protocols to ensure that all of the designed products met the appropriate standards for medical devices by various international and American standard committees, such as ISO and ANSI.

95,000

The number of face shields printed between May and October by the Engineering Response Team to be worn by caregivers in the Duke Health system.

Several projects were successfully brought to fruition over the summer, and among these, the Reusable Face Shield project stands out as the one with the largest scope. Between May to October, the Engineering Response Team printed a total of 95,000 face shields to be worn by caregivers in the Duke Health system. This massive manufacturing feat was made possible by having all hands on deck and finding help from unusual sources.

The Reusable Face Shield Team was led by Bobbert with assistance from Richardson, Palmeri, Shaw, Fearis and Evan Levine from the Office of Information Technology. Using an open-source design for the face shields, Bobbert was able to quickly print prototypes for testing and further refinement.

However, the team soon realized that 3D printing was not feasible for longtime manufacturing of reusable face shields. Due to the number of potential users in the Duke Health system and the predicted burn rate, the team would need up to 5,000 face shields a week, a rate that could not be sustained with 3D printing. Bobbert set out to develop a manufacturing strategy, while Palmeri tackled testing protocols to ensure the final design was up to spec.

"The effort of this group really highlighted

Konstantinos Economopoulos simulates patient care using COVIAGE, a patient isolation system. This device, which recently received an emergency use authorization from the FDA, is designed as a low-cost, portable isolation unit for patients that is functionally equivalent to a negative pressure room.

that bringing together lots of people, who organically wanted to be part of it, makes a huge difference," said Palmeri. "Everyone there was willing to put their own personal time and resources into it."

Most people still remember the shortage of essential items such as toilet paper and hand sanitizer in the early months of the pandemic, but these nationwide shortages expanded to materials and hardware products. Because of this, Bobbert and the team had to get creative with sourcing the materials that would comprise the face shields and the machines that would make them.

Some of the clear plastic that covered the face was purchased from a hot-air balloon supplier, and a metal manufacturing plant in Burlington was persuaded to cease operation to help produce various face shield parts.

Some of the clear plastic that covered the face was purchased from a hot-air balloon supplier, and a metal manufacturing plant in Burlington was persuaded to cease operation to help produce various face shield parts, Bobbert explained. To create the bend seen in the plastic face covering, the team used thermoforming. And when no thermoforming machines were available, Bobbert purchased a pizza oven and used it instead.

Before the large-scale manufacturing could begin, Palmeri rigorously tested the design until he was confident that it met the quality expected of a medical device and the overarching standards it was subject to. He set up a testing rig—as described in the ANSI standard that governs face shields—in his own home using items he already had. All of this was done to ensure that users of the face shield could be confident they were protected.

Other completed projects include a surgical hood and an aerosolization sampler clip, both of which are either in clinical use or in the process of being implemented. Richardson and Duke Surgeon Melissa Erickson took the lead on the surgical hood, which repurposed Stryker Flyte Personal Protection Systems to serve as PAPRs (powered air purifying respirators) for surgeons. Several other projects that stemmed from the initial needs-finding exercise, such as COVIAGE, a negative pressure tent designed to isolate infectious COVID-19 patients, continued to develop throughout the fall.

After the initial anxiety around the pandemic, Richardson says that the team has settled into what will be a marathon of device design, and faculty members are optimistic about the future impacts that this team will have for collaboration between the Schools of Medicine and Engineering. While the team is by no means the first of its kind, the strong and vigorous response of both institutions while faced with a seemingly unsurmountable enemy lends further credence to the importance of establishing strong collaborations between the two. The Engineering Response Team is the epitome of Duke's capabilities—creative innovation, high-quality results and an unrelenting pursuit of bettering the community. ■

Lily Hiser is a senior studying biomedical engineering.

Dr. Melissa Erickson dons a PAPR device featuring a 3D-printed part rapidly designed, tested and produced by the Duke COVID-19 Engineering Response Team.

Remote Engineering During a Pandemic

Pratt students and classes adapt to virtual learning

Sanika Gupte shows me her intricate circuit for her ECE 230 class. She constructed it at home using a remote engineering lab kit shipped to her at the start of the semester. With the global changes that have ensued since the start of the COVID-19 pandemic, the Pratt School of Engineering has had to adapt and improvise its teaching and learning strategies. Several engineering classes offered during the Fall 2020 semester were conducted as hybrid classes, which allowed students to choose from an in-person or online option for lectures and labs. This led to a challenging yet rewarding semester for all students, but especially those who had to adapt to taking classes entirely remotely from all around the world.

"We wanted to ensure that there were minimal barriers for a student to switch from the in-person to the virtual format if they needed to, so all lab materials were packaged into kits at the beginning of the semester."

The ECE 230 (Introduction to Microelectronic Devices and Circuits) lab kit for remote students.

The implementation of at-home labs by Pratt faculty and lab staff was an effort to engage remote students as best as possible. In ECE 230, Introduction to Microelectronic Devices and Circuits, students were provided with lab kits containing a multimeter, a breadboard, wiring, resistors and other circuit elements.

"Because of the lab kits, I even had the opportunity to rebuild my circuits later in the week if I was confused about questions on the lab report," says Gupte, a junior majoring in BME and ECE. She also enjoyed the conversations she had with other students during lab Zoom sessions and is grateful for how close-knit her lab section is. "It definitely was possible to connect to others virtually during the semester."

BME 221, Biomaterials, had one lecture a week that was online and one that was in-person, with remote students being able to Zoom into class simultaneously. This lecture style involved significant trial-and-error to figure out the best means to ensure that remote students were able to engage and ask questions through means of the Zoom chat or being able to unmute and speak up.

"As we planned for the semester, we didn't know how bad the pandemic was going to be on campus, so we approached the course with as much flexibility built into it as possible," says Joel Collier, associate professor of BME, who taught the class. "We wanted to ensure that there were minimal barriers for a student to switch from the in-person to the virtual format if they needed to, so all lab materials were packaged into kits at the beginning of the semester.

"The instructors also made many videos

Sanika Gupte

Contents of the BME 221 (Biomaterials) lab kit mailed to remote students for at-home labs.

OPPOSITE: *At-home set-up of a polymer creep experiment conducted over a span of four weeks to measure the distortion of the polymer under stress.*

and collected data sets on instruments that did not lend themselves to socially distanced experiments," Collier continues. "I also have to stress that conducting the course this way took a team of devoted instructors: lab instructors Marcus Henderson, Christine Mulvey, and Maggie Gatongi; and TAs Elizabeth Curvino and Josh Milligan worked tirelessly to realize this flexible format."

It was not a hassle-free process for all students, though. Ria Thimmaiahgari, a junior majoring in BME, never received her lab kit for BME 221, owing to the currently strict customs regulations in India. The fact that she was nearly halfway across the world meant that she, along with students in other countries like Hong Kong, Korea, Singapore and China, had to adapt her daily schedule to better be able to match EST work hours, which came with its own set of challenges.

"Taking classes, especially midterms, at 2:00 in the morning was far from ideal!" says Thimmaiahgari.

In addition, while professors held office hours and discussions on Zoom where students were able to work together and ask questions, most students agreed that the experience was just not the same as pre-COVID.

"I've always worked on problem sets with people, and we've used white boards and markers to explain things to each other, but that is of course not possible now!" says Phoebe Dijour, a BME junior. "Teamwork is much harder!"

While some remote Pratt freshmen decided to fulfill other class requirements in Fall 2020 and take their engineering classes in the spring, others opted to enroll in EGR 101 (Engineering Design and Communication) and EGR 103 (Computational Methods in Engineering). EGR 101 has a heavy design component that had to adapt to accommodate remote students. On-campus freshmen like Aarzu Gupta enjoyed the intensive hands-on and team-based nature of the class.

"Amidst Zoom calls all day, it was so refreshing to be able to have in-person interactions and hands-on projects," says Gupta.

Students taking the class remotely, though, have had a very different experience. First-year student Nidhi Srivaths said, "EGR 101 was definitely a challenge, but the professors and TAs really did their best to make sure we didn't miss out. It was obviously less hands-on, but we were shipped packages of prototyping material at the beginning of the semester, so surprisingly my team made great progress with physical prototyping! Our team consisted of four people from four different countries. Even scheduling meetings with the different time zones was initially daunting, but after a few weeks of settling in, we really found our rhythm."

Home lab kits certainly cannot replace the experience and excitement of conducting experiments in labs, and there is no question that seeing faces over Zoom is far removed from in-person interaction. It is evident that remote engineering has its fair share of challenges, but the commitment of the incredible faculty and staff and the relentless hard work of students allowed the Pratt community to adapt and overcome challenges in a year otherwise filled with uncertainty.

To summarize her experience this semester, Thimmaiahgari said, "I look forward to being back on campus next semester, but I think my remote learning experience will always stay with me!" ■

Simran Sokhi is a junior majoring in biomedical engineering.

Photography by Simran Sokhi

Pratt Student Organizations:

Resilience During COVID-19

Despite the pandemic, Pratt student organizations find ways to continue to provide enriching experiencing to its members

Logging into a Zoom meeting is now part of our everyday routine. Instead of walking to class, we click a few buttons, and then we find ourselves in remote classes and meetings. This shift to the remote sphere did not happen effortlessly. Students and professors alike gradually learned how to administer work and projects from a distance.

Engineering students especially had to adjust to this remote environment. Typically, projects involve iterating on a physical product, but in the midst of COVID, meeting in person to jointly work on a project has often been infeasible or impossible. Through stories from some of the student organizations in the Pratt School of Engineering, we can see how students have both struggled and succeeded in transitioning to the remote environment.

Duke Engineers for International Development (DEID) focuses on infrastructure projects throughout the world. In the summer of 2019, the organization constructed a footbridge in Bolivia and a vehicular bridge in Uganda. In 2020, the team was slated to construct another footbridge in Bolivia while also participating in a water, sanitation and hygiene (WASH) project in Indonesia.

However, following the outbreak of COVID-19, implementation trips for the summer of 2020 were canceled. According to DEID co-President Mia de Leon, a senior in BME, COVID altered club operations significantly. Canceling the implementation trips left 25 club members to find new summer plans. While the cancellation could have resulted in a stagnant summer for DEID, de Leon and fellow co-President Kieryn Ota, a senior studying biomedical engineering as well as electrical and computer engineering, decided to take a critical look at DEID's operations.

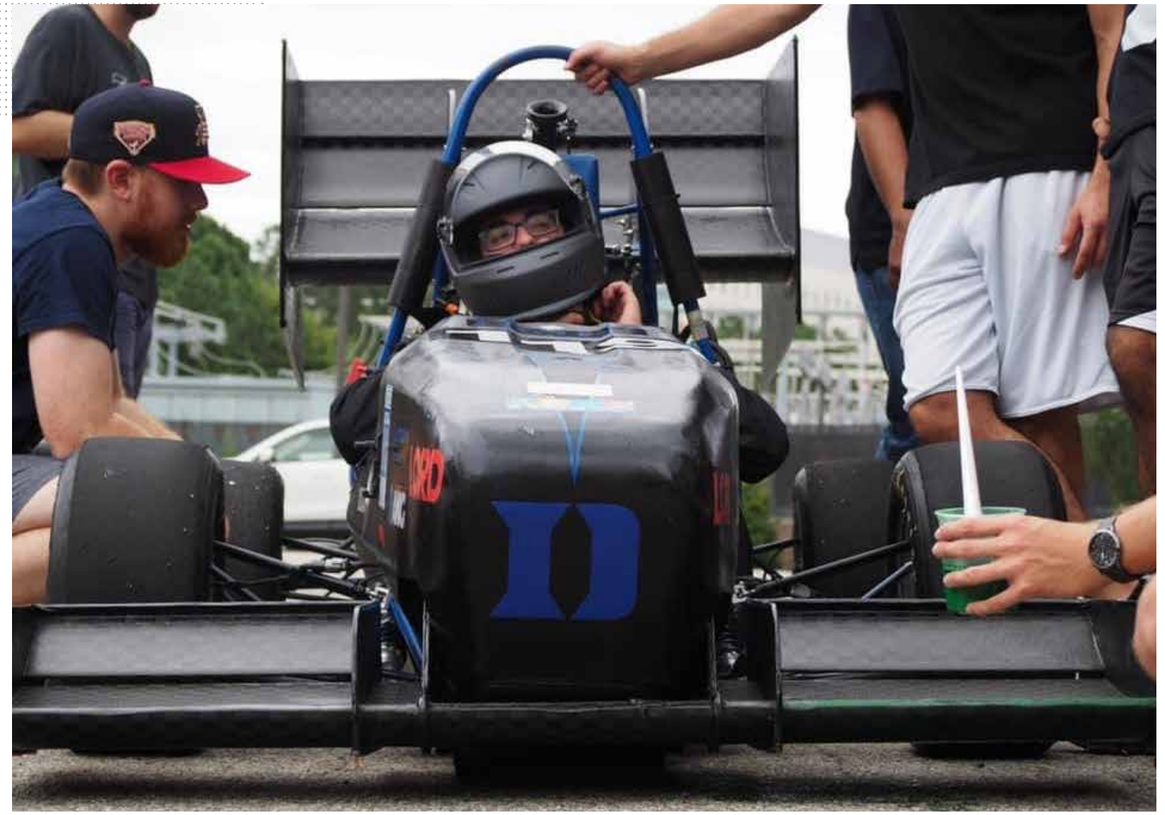
"While DEID has been successful in carrying out infrastructure projects, de Leon and Ota recognized that DEID could achieve more by engaging students on-campus and by maintaining meaningful relationships with partner communities."

A footbridge built in Bolivia by DEID in 2019.

Construction under way on the footbridge in Bolivia.

OPPOSITE, TOP: *In a meet prior to the pandemic, the Duke Motorsports team revs up for competition, with Alex Kornegay (left, ECE '21) and Edgar Uribe III (driver, ME '21).*

John Smalley (left) and Jacob Manders (right), both ME '23, and other students from Duke Motorsports work in small groups outside on their vehicle.



"This semester has offered Duke Motorsports a unique opportunity to dive deeper into validating their design."

While DEID has been successful in carrying out infrastructure projects, de Leon and Ota recognized that DEID could achieve more by engaging students on-campus and by maintaining meaningful relationships with partner communities. After considerable planning that took place over the summer, DEID managed to rethink its programming.

DEID successfully hosted multiple speakers, covering topics such as COVID-19, global infrastructure and project ethics. DEID also continued to have project meetings for their various projects, preparing students for the scenario in which travel is feasible by the summer of 2021. By leaning into the educational component of the projects, DEID has been able to meaningfully engage its members, even in an unusual semester.

The Duke Motorsports team also endured a drastic change of plans following the COVID-19 outbreak. The team's main objective is to compete in the nationwide Formula SAE (Society of Automotive Engineers) competition, in which teams from many universities race the vehicles they have been assembling throughout the year. The 2020 competition, which should have occurred in June, was canceled, and an online presentation event took place instead.

Edgar Uribe, senior mechanical engineering student and leader of Duke Motorsports, described how the pandemic has restricted the team. In the past, Duke Motorsports members would spend hours together in the garage, collaboratively resolving design issues late into the night. But due to COVID-19, Duke Motorsports is only permitting four students to work together at the same time.

According to Edgar, this reduced amount of people has challenged the team, but has also allowed for more organized work. This semester has offered Duke Motorsports a unique opportunity to dive deeper into validating their design. In remote environments, students are spending more time looking at simulations and models. As a result, the team has a stronger understanding of the design, and they feel more confident that they are making correct design decisions. This opportunity to focus on theory and design is raising the knowledge base of the team members, and therefore preparing the team for success moving forward.

Student organizations throughout Pratt have had to handle similar struggles. Canceled plans, canceled projects and remote work have disrupted everyone. However, rather than pause organization operations, Pratt students have looked to improve their projects. These organizations have even innovated by making project teams accessible to remote students.

Most importantly, Pratt students have taken opportunities to develop parts of their projects that were undeveloped before. DEID implemented a new speaker series, Motorsports evaluated their design to a greater degree and the many other organizations of Pratt have responded in similar ways. The resilience demonstrated by Pratt organizations reflects the hard work and consideration provided by student leaders during 2020. These innovative and impressive efforts have set student organizations up for continued success in 2021. ■

Woodley Burrow is a junior from Houston, Texas studying mechanical engineering.

Saving the Summer Internship

Phoenix Project provides critical summer internships for students during the pandemic

For college students all around the nation, the global pandemic did more than force them off campus and into online classrooms—it also caused them to face an empty summer schedule with many prominent businesses being forced to cancel their internships.

Students who had worked hard in landing prized internships to gain much-needed work experience—and hopefully some cash as well—watched as their years of effort went up into puffs of smoke. While companies focused on entertainment and travel couldn't afford to hold their internship programs, many businesses, especially in the digital services and biotechnology sectors, needed the expertise and skills in software and data science that students brought to the table. All that was needed was something to tie the two together.

And so, from the ashes of the pandemic, the Phoenix Project was born, led by Mary Gooneratne (ECE/CS '21) and Luke Truitt (ECE '21), who saw an opportunity to help their fellow Duke students. The project hoped to match Duke students who had technical expertise with various organizations, institutions and businesses for remote work. As Truitt puts it, "After doing it with [Duke Applied Machine Learning] so frequently, it felt like it was my responsibility to do something after seeing so many students and individuals lose their jobs and internships."

The project itself was a resounding success. "There were more applications on both sides then we could handle," says Truitt. "When getting the organization off the ground, we unfortunately had to cut out a lot on both sides."

At the end of the process, a total of 74 companies offered 210 Duke students remote internships over the summer, allowing them to work on projects ranging from analyzing water heater behavior to working with the Department of Defense in modernizing the 4th Medical Division's Mobile App diagnosing capabilities.

The work done in the Phoenix Project was not limited to projects. Truitt and other leaders in the organization, along with the Duke Career Center, arranged speaker panels and workshops with companies to help students expand their technical chops. Demo days were held for students to allow them to practice delivering results to clients and technical assistants, and other resources helped the students get past short-term blocks and focus on their projects.

Project Phoenix also received help from Duke faculty and staff. Truitt particularly emphasized the importance of Steve McClelland, an executive-in-residence at the Pratt School of Engineering and faculty member in Duke Engineering Entrepreneurship (EngEn) and Duke Innovation & Entrepreneurship (I&E). To help support the project, McClelland initially provided the project with $80,000 in funding for stipends. "McClelland was also a huge help as the sounding board for building out the program," says Truitt.

Phoenix Project went so well that it might be here to stay. Many participating companies have reached out in the hopes of continuing the work done over the summer. The Department of Defense was so impressed with the work done that a large contract was put in place to continue work in Fall 2020.

"College students around the nation could have something to help them find remote internships with less well-resourced businesses, all of it staffed and managed by folks who can handle it."

Truitt himself has big plans for the organization moving forward. Major League Hacking, a global company known for their hackathons, has personally reached out to Truitt to create a joint fellowship with the Phoenix Project.

"We're currently working together to build up this fellowship, and it's allowing us to help out a lot more than just Duke students," says Truitt. "College students around the nation could have something to help them find remote internships with less well-resourced businesses, all of it staffed and managed by folks who can handle it. And they'll have a large class of fellow interns to learn from and develop alongside."

The Phoenix Project's second coming is currently under way in tandem with Major League Hacking and the National Security Innovation Network, and is running under the name the "Tour of Duty." Version three will be launched in January with a slew of private businesses. ■

Zongsen Li is a freshman planning to major in biomedical engineering.

Revolutionizing Neurosurgical Planning With the Use of **Holograms**

Cameron McIntyre brings to Duke a long history of translating innovations in Deep Brain Stimulation into commercial medical devices

Movement disorders have outwitted researchers for decades. The brain's complex neurological structure makes the treatment of Parkinson's, essential tremor, dystonia and other motor disturbances risky and inadequate. But Deep Brain Stimulation (DBS), a revolutionary clinical procedure, has brought hope to patients who suffer from these illnesses.

DBS calls for the implantation of a small pacemaker under a patient's clavicle. Insulated wires carry electrical pulses from the pacemaker to the basal ganglia, a region of the brain that is responsible for planning movement. The results can be astounding—tremors dissipate and motor control improves. However, positive outcomes are not always guaranteed.

Cameron McIntyre joins the Duke Engineering faculty in July 2021

Cameron McIntyre, a pioneer in the field of DBS, has created holographic platforms to allow neurosurgeons to visualize the brain's anatomy in three dimensions. These tools can be used to help surgical teams plan a patient's DBS surgery. This July, Duke will welcome McIntyre to the faculty of the Department of Biomedical Engineering and the Department of Neurosurgery.

McIntyre has a BS and PhD in biomedical engineering from Case Western Reserve University. Additionally, he received postdoctoral training from Johns Hopkins University and Emory University, where he studied DBS.

In McIntyre's freshman Introduction to Biomedical Engineering class, he was introduced to electrical stimulation by a guest lecturer, Hunter Peckham, the Donnell Professor of Biomedical Engineering and Orthopaedics at Case Western. Peckham is known for his groundbreaking research on the use of electrical stimulation and implantable devices to activate otherwise unresponsive areas of the body. During this presentation, Peckham brought in research subjects as examples of his work. McIntyre witnessed a patient with spinal cord injuries using a hand which had previously been immobile. This was achieved through the implantation of electrodes, devices that carry electrical pulses to specific areas of the body. These subjects demonstrated the incredible effects of electrical stimulation technology.

McIntyre describes this presentation as life-changing. "I just remember thinking, I don't really know what I want to do with my life, but if I could do something like that, that would be cool."

McIntyre began working with Warren Grill, who was a junior faculty member at Case Western at the time. Grill, now a professor of biomedical engineering at Duke, teamed up with McIntyre to research the effects of using electrical stimulation in spinal cord therapy. McIntyre continued to pursue this research as he began his PhD at Case Western.

Near the end of McIntyre's PhD studies, at the start of the new millennium, DBS became available as a clinical treatment in the US. However, as DBS was still new, most scientists were not exploring its possibilities. McIntyre, on the other hand, found DBS fascinating. He saw it as an "opportunity that would take engineering knowledge and put it into something that might be clinically relevant." He wanted to expand the viable treatments available to patients with movement disorders.

McIntyre's lab at Case Western is currently using its research on neurology, neuroanatomy and DBS to create tools that make neurosurgery more effective. These tools are holographic visualization platforms for neurosurgical planning, which McIntyre describes as "based primarily on a Microsoft HoloLens 2 Headset—a head-mounted display that gives you a simulation of a 3D hologram in the space around you." This technology is a new way to visualize data, and one that can be applied to very specific neurosurgical procedures. With this device, surgeons are able to see both the real world and an augmented visual state, a hologram.

Cameron McIntyre demonstrating the use of his holographic visualization tool at Case Western.

This technology is a new way to visualize data, and one that can be applied to very specific neurosurgical procedures.

Before a neurosurgeon can perform a complex surgery, they must first set aside hours to plan out the case and the procedure. Many parts of a neurosurgical procedure are difficult to visualize, due to the brain's complicated anatomy. McIntyre's holographic platforms give neurosurgeons an effective way to visualize the brain.

The holographic visualization platforms McIntyre and his team developed are currently academic prototypes. The next step McIntyre could take with these tools is to commercialize them and put the instruments into clinical practice. However, the process of commercialization is long and arduous, involving years of testing and clinical trials before achieving FDA approval.

Fortunately, McIntyre is not new to the field of commercialization. His first startup company created a software tool to help neurologists customize stimulation parameters for individual patients. After that, he created software to help neurosurgeons identify target locations in a patient's brain for electrodes. Now, his newest company provides clinical education to neurosurgeons and neurologists on the operation of DBS tools. He uses holographic representations in his training.

McIntyre's business success has taught him important skills. He says all entrepreneurial engineers should learn three things.

"First, learn how to solve the problem," he says. "Second, learn how to identify the right problem to solve that is also financially viable."

During the COVID-19 pandemic, McIntyre has also learned to be flexible. He and his team work remotely but are as productive as ever.

McIntyre is excited to join Duke's collaborative community this summer. "One of the things that's very special about Duke," says McIntyre, "is that you have a really great medical center and a really great engineering center within a hundred yards of each other." This proximity promotes collaboration between top experts in many fields, including neurosurgery, neuroscience, machine learning and engineering.

"That's an academic person's dream," says McIntyre. "That's where ideas come from, and that's where technology comes from." And, coming from Cleveland, Ohio, he is especially looking forward to North Carolina's warm weather—the sunshine and the lack of snow! ■

Hope Pratt is a freshman from New Jersey planning to major in biomedical engineering.

Designing the Future of

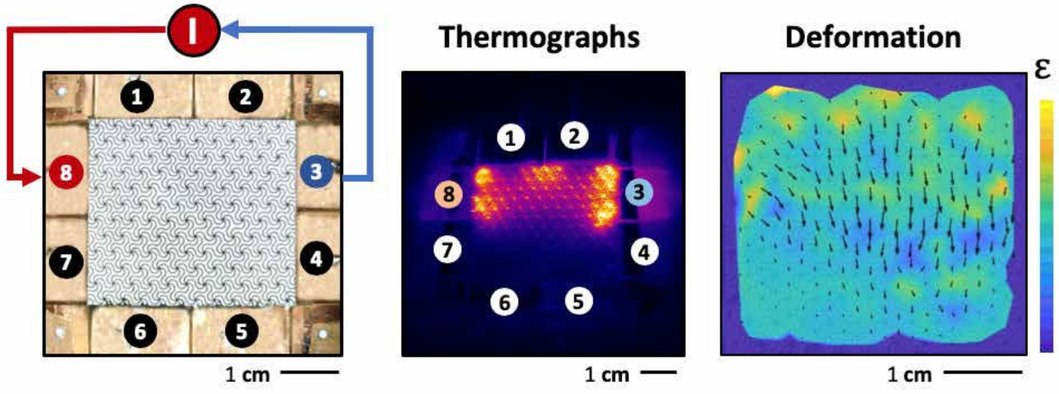
Medical Technologies

Xiaoyue Ni is pushing her field into the future using smart materials and wearable devices

Xiaoyue Ni is a new assistant professor in the Pratt School of Engineering who works between the Thomas Lord Department of Mechanical Engineering and Materials Science and the School of Medicine's Department of Biostatistics and Bioinformatics. Her highly interdisciplinary research in the areas of nanomechanics, smart materials, wearable electronics and artificial intelligence encompasses broad fields targeted toward developing intelligent products and materials.

Ni began her term at Duke in November 2020 following a three-year tenure as a postdoctoral researcher at the Querrey Simpson Institute for Bioelectronics at Northwestern University. She worked under the advisement of John Rogers, the Simpson/Querrey Professor at Northwestern, who is known as a pioneer in flexible electronics. Her work involved developing wearable sensors for human health monitoring, particularly in human body mechanics,

"The engineering and medical schools being in close proximity enables doctors to be mentally connected to engineers."



2D mechanical metamaterials with programmable local lattice deformation via integrated electrical source of thermal actuation.

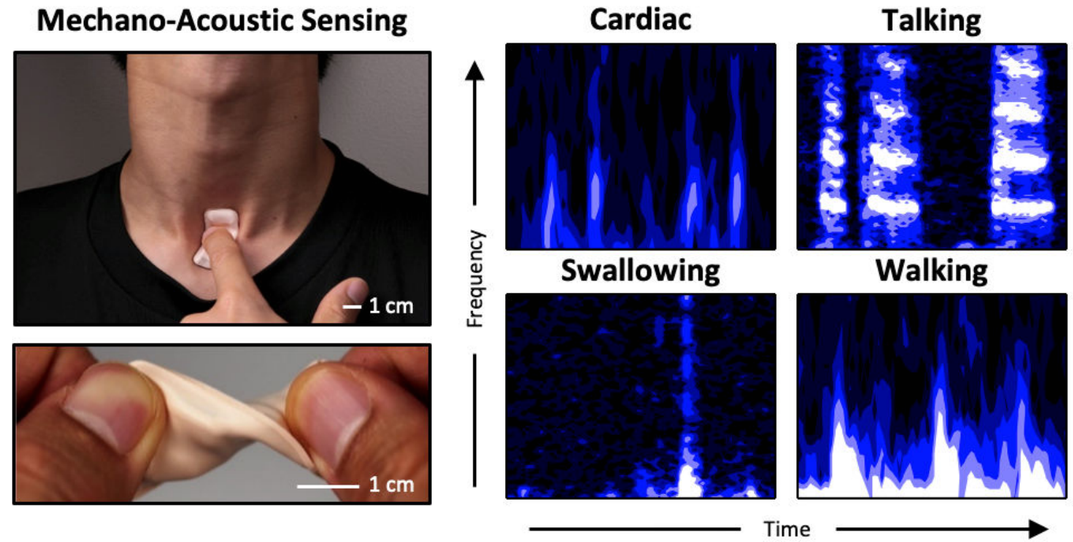
as well as advanced metastructures for active and intelligent materials.

Ni's research focusses on two broad areas—smart materials and wearable technology. While the former is a close amalgamation of her undergraduate and graduate backgrounds, the latter is an area in which she developed expertise while working as a postdoc. The aim of her research is to create smart materials that can sense a human body signal and monitor human activities in real time.

"I worked extensively in the area of mechanics of materials during my PhD, particularly in the area of studying deformation microstructures in natural, single crystalline materials like copper," Ni said. "I'm now aiming to use this knowledge to develop intelligent materials that can have an unparalleled match in terms of artificial microstructures enabling mechanical capabilities. It provides innovative methods to simulate the natural or bio counterparts to perform specific functions." Ni's research focuses on developing these metastructures for smart materials, which she refers to as programmable matter.

"Collecting real-time data is the experimental way to study human body quantitatively."

The second area of research involves developing wearable technology, which can be used in real-time diagnostics and treatment. "Collecting real-time data is the experimental way to study human body quantitatively," said Ni, who adds that this is an area in which doctors and engineers are able to work together to the maximum.



This technology relies on measuring the mechanical and acoustic signals from human bodies using a unique, skin-like device and then post-processing the data using state-of-the-art signal processing and artificial intelligence techniques to extract the information of interest. One of the major challenges, Ni says, is the noise in the data, which must be sorted out from the acoustic signal.

This area of research is highly interdisciplinary and involves a multitude of both core mechanical and electrical engineering concepts from mechanics, vibration and acoustics to signal processing to the modern-day niche technologies of machine learning and artificial intelligence.

Ni concludes by saying that the ultimate goal is to extract the maximum possible amount of high-quality signals to better monitor human bodies continuously. The collected information also serves as feedback for both the development of the next generation of wearable devices and the invention of novel artificial biomaterials. Their incorporation will provide insights for realizing a seamless human-material interaction in the future.

Ni's work is a duet of fundamental materials science combined with concepts derived from pure science fields, particularly physics.

"I love the interdisciplinary nature of Duke," said Ni, when asked why she chose to come to Duke. "The engineering and medical schools being in close proximity enables doctors to be mentally connected to engineers. This enables highly efficient cross-collaboration research, which makes Duke unique." ■

Shreyas Hegde is a PhD student in the Aeroelasticity Lab, advised by Professor Bob Kielb.

A wireless, soft, skin-mounted electronic system that incorporates MEMS accelerometers with capabilities of recording body kinematics, along with multimodal MA signatures of underlying body processes.

Keeping **Airplanes**, **Rockets** and **Helicopters** in the Sky

Aeroelasticity at Duke University has grown and thrived for more than three decades

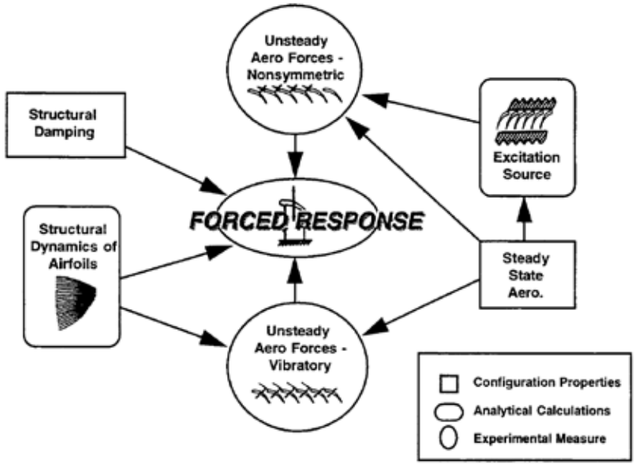
Events affect everyone differently and can have deep impact on their present and future. One such event happened on the morning of January 8, 1989, during a routine scheduled flight from London's Heathrow Airport to Belfast International Airport, Northern Ireland.

A fan blade in the left engine broke.

However, indicators on this new edition Boeing 737-400 made the pilots believe that the issue was with the right engine. As a result, the actual functioning engine (the right one) was shut down while the damaged engine (the left one) was filled with fuel, igniting it. The pilots attempted an emergency landing at East Midlands Airport, but crashed onto a motorway near Kegworth, England. Forty-seven people lost their lives and even more sustained serious injuries in this aerospace disaster.

This unfortunate event inspired one particular student to go work for General Electric to improve jet engines. Thirty years later, Robert Kielb, professor of the practice of mechanical engineering and materials science, now teaches vibrations at Duke University, after studying the field of turbine engines at General Electric and NASA.

Similar to Kielb, the faculty who make up the Aeroelasticity Laboratory at Duke University have a commitment to improve the technologies that govern the development of airplanes, rockets and helicopters, and help them reach the sky and beyond. Located within the Thomas Lord Department of Mechanical Engineering and Materials Science (MEMS), the laboratory focuses on three main research efforts to solve present-day problems in aerospace engineering: experimental testing in a low-speed wind tunnel, rigorous theoretical models and large-scale computational simulations. Recent advances include hypersonic beam and plate dynamics, helicopter rotor wake simulations, embedded compressor-rotor



ABOVE: *A flow chart from the GUIde Consortium circa 1991 outlining the various types of forces involved in forced response calculations.*

OPPOSITE: *The wind tunnel at Duke University has tested aerodynamic designs for the GUIde Consortium for decades.*

interaction and vortex-induced vibrations of turbines, among many others.

The history of the group is as diverse and unique as its members, and to understand it well, we talked to the longest-tenured member of the Aeroelasticity faculty: Earl Dowell, the William Holland Hall Distinguished Professor of MEMS.

The Birth of the Aeroelasticity Laboratory

When Dowell first came to Duke back in 1983, aeroelasticity was a new activity for the School of Engineering. Coming from Princeton University, he had been with experts in fields like fluid mechanics, dynamics and structural mechanics individually, but those fields were not often being studied together at most universities. Duke's strong interest in interdisciplinary research provided a unique opportunity to study these fields together; thus, the Aeroelasticity Laboratory was born.

With time, additional members joined. Lawrence Virgin was a post-doc under Dowell and has since stayed at Duke, going on to become a professor of MEMS and Civil and Environmental Engineering (CEE), chair of the latter for a time, and currently running the Nonlinear Dynamics Laboratory. Donald Bliss, associate professor of MEMS, brought in his

“Nobody studies the same thing for their entire career anymore, so I focused on faculty and students who displayed strong characteristics, regardless of what they may have previously been working on.”

knowledge and expertise in aerodynamics and acoustics. In 1990, Kenneth Hall, now the Julian Francis Abele Distinguished Professor of MEMS, joined the faculty after working at United Technologies Research Center (UTRC), where he was working as an engineer. Hall—who would later serve six years as the chair of MEMS—works on unsteady aerodynamics and aeroelasticity, with a focus on aeromechanical problems in turbomachinery.

During the time when the group was growing, Dowell had the additional responsibility of being the dean of Duke Engineering. On being asked how he handled the lab responsibilities while serving as the dean, his response was as insightful as his work.

“As the dean, I had to take a broad view of not only the department, but of the entire school of engineering,” said Dowell. “I definitely did not want to feather my own nest, so to speak. So I just focused on looking for good people to hire. Nobody studies the same thing for their entire career anymore, so I focused on faculty and students who displayed strong characteristics, regardless of what they may have previously been working on. For example, after the start of my research in aeroelasticity, I then turned to the study of nonlinear dynamics and chaos, but now I focus more on aerodynamics, limit cycle oscillations and developing reduced order models.”

Three Decades of Excellence

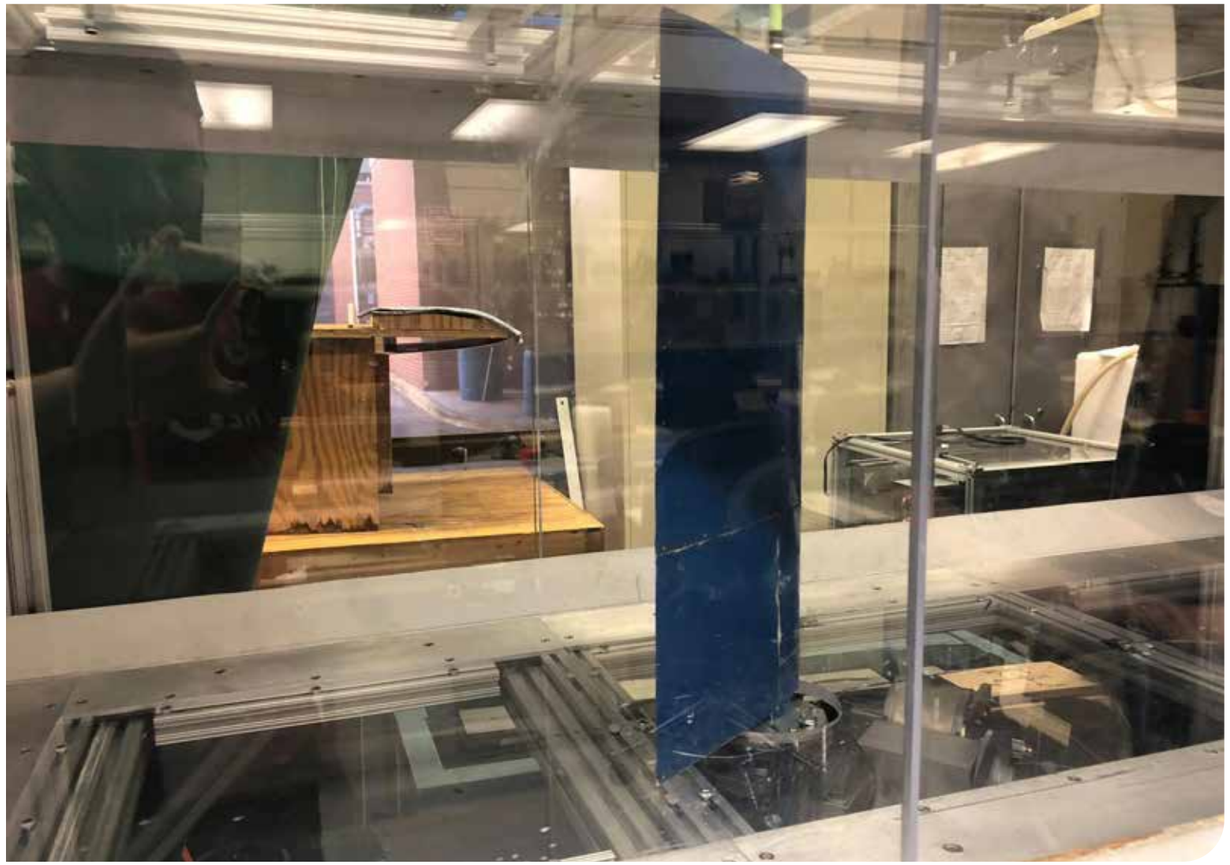
In total, nearly one hundred students have participated in activities associated with the Aeroelasticity Laboratory. They have earned doctoral, master’s and bachelor’s degrees in mechanical engineering. In addition, students have completed the undergraduate certificate in aerospace engineering, or the newly created SOAR graduate aerospace certificate. These certificates are the only way to earn an aerospace engineering distinction from the university, vital for the students who then go on to work in the aerospace field at companies such as NASA and SpaceX.

Acronyms are popular with the lab, as it also participates in the THRUST Master’s Program, a two-year international program with partner universities in Sweden and Belgium. Receiving funding from the European Union, students study turbomachinery aeromechanics at KTH in Stockholm, complete a summer internship at any aerospace company, and then spend a year completing their Master’s degree and a research project at either Duke or Universite de Liege in Belgium.

Kielb has been an integral part of this program for all 10 years so far, teaching one of its fundamental courses and advising students who choose to attend Duke for year two. Upon completion, students receive two master’s degrees, which is unique to this program, the only one of its kind at Duke.

The Aeroelasticity Laboratory’s projects are not just limited to Duke; one prominent involvement is within the GUIde Consortium. Standing for Government, Universities, and Industry, this consortium researches issues in turbomachinery. Projects come directly from engine companies, while quarterly updates provide constant communication between the researchers at the partner universities.

The GUIde Consortium began at Carnegie Mellon University in 1991 to study high-cycle fatigue problems in engines. Funding came from multiple industries as well as the US Air Force and NASA. In the early 2000s, GUIde moved to Duke University, where it remains today. GUIde 6, the sixth iteration of projects, kicked on in 2019, with Duke focusing on forced response, nonsynchronous vibrations and system identification techniques.



A fan blade used in turbines being tested in a wind tunnel at Duke.

Over the years, faculty have won multiple national awards from organizations such as the American Institute for Aeronautics and Astronautics (AIAA), the American Society of Mechanical Engineers (ASME), the National Academy of Engineering, and more. What sets this group apart from other laboratories, however, is the interdisciplinary nature of projects between members, using cutting-edge techniques to solve present-day issues.

Bliss and Dowell published papers on the use of piston theory to study unsteady aerodynamics, especially in hypersonic flow, which is flow moving at speeds five times greater than the speed of sound. Hall and Thomas developed a harmonic balance computational tool to study unsteady aerodynamics in cascades of airfoils, which has even been used to study turbomachinery aeromechanics problems with Kielb. Virgin and Kielb studied nonlinear dynamics in fan blades and stator vanes—work that won a John P. Davis award from ASME. Dowell also worked with Kielb and Thomas to study vortex-induced vibrations on an airfoil experiencing nonsynchronous vibrations.

There are few labs with the unique level of collaboration on all facets of modern-day aerospace research quite like the Aeroelasticity Laboratory. So here’s to decades of excellence in aerospace engineering at Duke University thus far, and many more to come. ■

Richard Hollenbach and Shreyas Hegde are PhD students in mechanical engineering studying aerodynamics and vibrations in turbomachinery under Robert Kielb within the Aeroelasticity Laboratory.

Engineering Entrepreneurship:
An Engine for Innovation

Duke Engineering's new "EngEn" initiative serves as a catalyst for the creation of high-impact products and cutting-edge technology

"I have an idea!"

These well-known words have been exclaimed by innumerable engineering students hoping to build products that will grow to be the next Microsoft or Apple. A new initiative to develop lifelong innovators, Duke Engineering Entrepreneurship (EngEn), serves as a catalyst for the creation of high-impact products and cutting-edge technology. Best described by Associate Dean of Entrepreneurship Ken Gall, "EngEn is an engine for innovation—driving the cycle of problem identification, solution development and the robust launch of new ventures."

The program is spearheaded by talented engineers, successful entrepreneurs and renowned professors working together throughout the entire life cycle of an idea. EngEn integrates entrepreneurial education, needs-driven design experiences and startup resources to support fledging student, staff and faculty inventors. In the prior fiscal year alone, EngEn assisted in some of the 132 invention disclosures, 37 issued patents, 49 sponsored research agreements and 54 spin-off companies originating in faculty research.

Duke EngEn currently sponsors 15 unique programs and resources while partnering with 12 peer initiatives and organizations. Undergraduate

A. James Clark Scholars hosting a STEM Leadership Camp for Durham middle-school students in 2019.

ABOVE: Student startup Protect3d at the NFL 1st and Future Innovation Competition (from left to right: Ken Gall, Kevin Gehsmann, Clark Bulleit, Tim Skapek).

EngEn co-leads Bill Walker and Steve McClelland providing guidance to student startup OptiML.

educational initiatives, such as the A. James Clark Scholars Program and the Student Founders Program, offer coaching, skills training, workshops and a supportive entrepreneurial community.

Filip Bartel, a junior majoring in civil engineering, highlighted the mentorship and community of EngEn as a major draw toward the program. "Being mentored by professors who are entrepreneurs themselves has been valuable, since they share mistakes to avoid and tips for success from their own experiences," said Bartel.

Meanwhile, paths like the Entrepreneurship & Founders Track of Duke's Master of Engineering Management Program or the Master's Certificate in Medical Device Design are popular with graduate students focused on expanding their entrepreneurial skillset.

A key component of EngEn is fostering innovation within the Pratt student body, both undergraduate and graduate. Mentored by Gall, three engineering undergraduates founded Protect3d, a company using 3D modeling technology to produce custom-built protective devices for athletes. Protect3d went on to win the NFL's 1st and Future Innovation Competition, netting $50,000 to invest in the company.

Another start-up founded by Duke students, OptiML Solutions, received support from EngEn to develop a portable imaging device and a machine learning model that can diagnose eye diseases quickly and cheaply.

Besides providing support for start-ups, EngEn is fostering a diverse and inclusive community of inventors who work together with a common goal of improving society. Marcellus Jordan, a junior majoring in mechanical engineering, says, "Since my first day as a Black engineering student, Pratt entrepreneurship has been very inclusive and even helped me arrange a study abroad in South Africa to work at a tech startup." In hopes of combating the inequalities of public education, he plans to invent an affordable robotics kit that allows underfunded students to gain exposure to STEM.

In response to the emergence of COVID-19, EngEn responded by helping to create the Duke COVID-19 Engineering Response Team. Collaborating with the Innovation Co-Lab and Duke MEDx, among others, the team aims to increase Duke Health's inventory of vital protective gear and medical equipment. Among other projects, the team has developed a custom powered air-purifying respirator (PAPR) system and shared the design with over 80 institutions, manufactured more than 30,000 reusable 3D-printed face shields (with a goal to produce 75,000 units), and built 200 hand sanitizer dispensers to aid the reopening of Duke research laboratories. The work closely reflects the notable Duke Design Health program, which connects engineering

"Being mentored by professors who are entrepreneurs themselves has been valuable, since they share mistakes to avoid and tips for success from their own experiences."

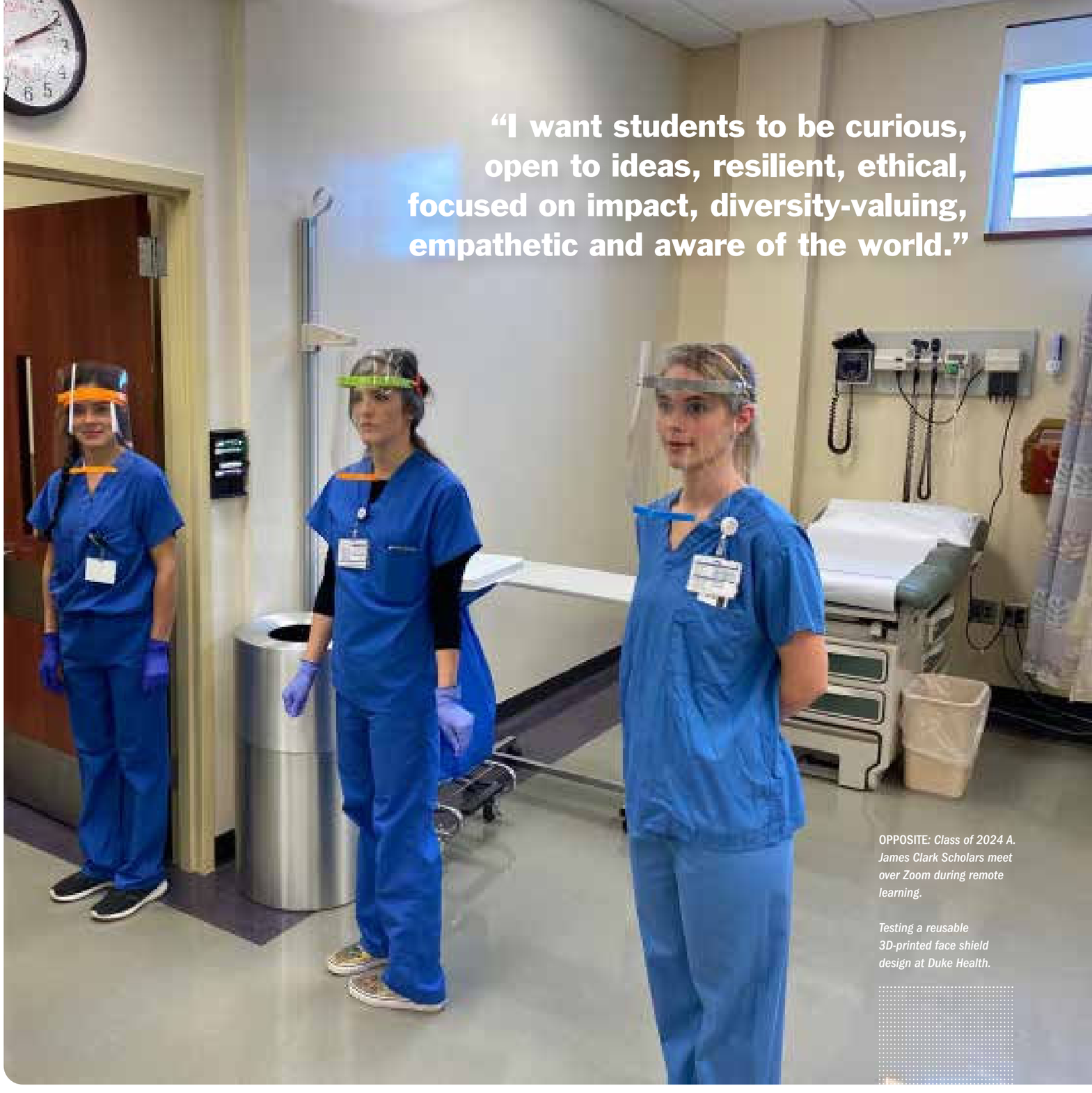
and business graduate students to medical trainees with the goal of developing needs-based solutions for the medical field.

EngEn also has plans for expanding the scope and breadth of the programming they offer. Opened in November 2020, Duke Engineering's new Wilkinson Building provides two additional spaces for entrepreneurship, mirroring EngEn's comprehensive problem-to-design-to-launch process. A Center for Innovation will empower founders to investigate and uncover societal needs as well as develop and validate unique tech solutions. A Center for Entrepreneurship will support founders who are launching new products, services and companies. In addition, anyone can schedule one-on-one consultation meetings at these centers to converse with experienced advisors about potential ideas.

Bill Walker, the Mattson Family Director of Engineering Entrepreneurship, emphasizes a focus on values embedded within EngEn's approach and teachings. "Values build us up as people and allow us to build organizations that are meaningful. I want students to be curious, open to ideas, resilient, ethical, focused on impact, diversity-valuing, empathetic and aware of the world around them," he said.

EngEn isn't just building great innovations to address societal needs in health, defense, climate change and more—the initiative is building great people, students and leaders. ■

Philip Liu is a junior studying mechanical engineering, economics, and I&E.



OPPOSITE: *Class of 2024 A. James Clark Scholars meet over Zoom during remote learning.*

Testing a reusable 3D-printed face shield design at Duke Health.

An Exploration of the

Pratt IDEAS Program

Duke Engineering's IDEAS Program provides students a path for creating their own unique major

The Pratt School of Engineering offers a range of academic paths for undergrads, such as certificates, joint major programs and a 4+1 master's degree. However, there's another lesser-known academic route available to Pratt students—the Interdisciplinary Engineering & Applied Science (IDEAS) program.

The IDEAS program, similar to Trinity's Program II major, allows students to create a unique degree by selecting their own sequence of courses offered at Duke. A major draw of the degree is that students shape their learning experiences around the fields that are not necessarily already connected by Pratt's existing degree programs.

The process for declaring an IDEAS major is fairly straightforward. First, prospective IDEAS students reach out to potential faculty advisors to begin creating a four-year plan for their major. Linda Franzoni, associate dean of undergraduate education, has an important role in the matchmaking process between students and faculty advisors. Next, students must write a proposal as to why they want to pursue their unique major and why current degrees at Duke don't satisfy their academic needs. Finally, Franzoni and other Duke faculty, including the directors of undergraduate studies and academic deans, review the proposal. More often than not, the plan will be sent back to students for revision to better align with Pratt's educational goals, typically adding and removing classes from the proposal. After revision, the committee reviews the plan again and passes it on to the Engineering Faculty Council (EFC), a group of eight faculty members that vote on finalizing an IDEAS major.

Since its inception in 1981, the Pratt IDEAS program graduates one or two students per year, with a wide array of degrees. However, there are some quirks in its short past. For example, between 1986 and 1992 almost every person with a declared IDEAS major studied biochemical engineering. Those years coincided with the recent opening of the North Carolina Biotechnology Consortium, which was hiring multitudes of experienced biochemical engineers.

This glut of biochemical engineers was reflected in Duke's hiring practice, as several joined as part of Pratt's faculty. Due to new availability of chemical engineering professors, students were able to put together courses to create a biochemical engineering major. However, this program was eventually discontinued, as chemical engineering courses were phased out or absorbed into existing departments.

Although the flexibility of the IDEAS program is its strongest asset, that unpredictability also has drawbacks that can have ramifications on a student's path at Duke. As Franzoni points out, "The biggest thing that concerns me when a student designs their own major is that there's no guarantee that those courses will be taught in the future."

Since IDEAS majors tend to rely on more niche subjects that may revolve around a few courses taught by a single professor in a single semester, the course load for IDEAS majors is always uncertain. However, students are partnered with a faculty advisor who can help them navigate through those obstacles and find alternative courses that can still be used to fulfill their IDEAS major.

"It was a really fun challenge, because it forced me to reach out to a lot of upperclassmen and professors."

Grace Dessert, a junior in Pratt, has gone through the process of creating her own IDEAS major and is currently majoring in neural engineering. Her path may have been more unconventional than the typical Pratt student, but highlights a lot of the benefits of and reasons why a student would pursue an IDEAS major.

Dessert started her time at Duke planning to major in neuroscience, but quickly found that her interests were more aligned with the quantitative side of neuroscience. She switched into Pratt the spring of her first year with a plan to major in biomedical engineering, a traditional path for a combination of engineering and medicine. However, she soon discovered that completing the major a semester behind, and with minimal AP credits, was going to be an arduous task.

Instead, Dessert decided to look into other options, stumbled across the IDEAS program on the Pratt website and realized that the program would be a great fit for her skill set and interests. When she inquired about the IDEAS program with some of her upperclassmen engineering friends, she was disappointed to realize that no one else knew how it worked. That's when she reached out to Franzoni and talked with Warren Grill, professor of biomedical engineering, who became her advisor, to create the major "neural engineering."

"I love the freedom first and foremost," says Dessert. "How I can choose every single class that I get to take. I love how it's so interdisciplinary and I still get a lot of depth of study to take classes like math, BME and neuroscience without having to overload."

When it came time to plan her own coursework, Dessert initially found it slightly daunting because she didn't know what courses would allow her to be a successful neural engineer. "It was a really fun challenge, because it forced me to reach out to a lot of upperclassmen and professors. So I got to know cool people and talk to them for their advice and do a lot of research on my own," said Dessert. Since her initial proposal, she has revised her degree outline twice as she continues to explore the major.

Before declaring for an IDEAS major, however, students should carefully consider their potential career paths after college. Any major created through the IDEAS program is not an ABET-accredited major, which is typically a requirement to receive a Professional Engineering (PE) license. If a student wants to pursue engineering in the professional world, the IDEAS program may not be the best fit. For those interested in academia, medicine or other non-engineering disciplines, the IDEAS program is a promising major choice.

Overall, the Pratt IDEAS program can open new doors for students interested in unconventional degree paths and pursuing an education that ultimately reflects their passions and goals. Although trailblazing a new major can be intimidating and has its drawbacks, the fluidity of the IDEAS program allows for continuous revision and exploration into emerging fields and technology! ■

Talya Jeter is a sophomore majoring in biomedical engineering.

Classnotes

1960s

Jerry C. Wilkinson E'67, his wife, Beverly, and their family have been recognized for their lifetime philanthropic and service contributions with the naming of Duke's newly opened engineering building as the Wilkinson Building.

Jerry Wilkinson, a 1967 electrical engineering graduate and founder of the Wilkinson Companies, and Beverly Wilkinson have been volunteers and donors to Duke's Pratt School of

Engineering for decades. Their most recent contribution, a cornerstone gift to the Building for the Future of Duke Engineering campaign, will fund the innovative research and educational initiatives that will take place within the new $115 million engineering building.

In addition to state-of-the-art design labs and active-learning classrooms, the building features a Center for Engineering Entrepreneurship, a Center for Innovation, a Learning Commons and a 200-seat auditorium, expanding Duke Engineering's current student education and programming space by 50 percent.

Located at the nexus of Engineering, Medicine and Arts & Sciences, the Wilkinson Building will also house three interdisciplinary research neighborhoods focused on solving challenges related to computing and AI, the environment and human health.

To learn more about the Wilkinson Building and its naming, visit **pratt.duke.edu/about/news/dukes-new-engineering-building-named-honor-wilkinson-family.**

A past chair of the Pratt School of Engineering Board of Visitors, Jerry Wilkinson received the Duke Engineering Distinguished Service Award in 1997 and the Duke Alumni Association's Charles A. Duke Award in 2012.

He and Beverly Wilkinson have a long history of philanthropy to Duke, establishing the Beverly A. and Jerry C. Wilkinson Scholarship, Myrtle Coker Wilkinson Scholarship, and Wilkinson Family Fellowship, as well as naming the Jerry C. Wilkinson E'67 Laboratory and The Robert Gordon Wilkinson Center for Engineering Management.

The Wilkinsons have three daughters, all Duke alumnae, and eight grandchildren. They split their time between Atlanta, Georgia and Amelia Island, Florida.

Heather Wilkinson Deguire '98; Hayley Wilkinson Brammer '00; Bev Wilkinson P'98, P'00, P'03; Jerry Wilkinson BSEE'67, P'98, P'00, P'03; and Hilary Wilkinson Bayer '03

1990s

Valecia D. Maclin E'92 has been named to the CMMC-AB, Software Assurance Forum for Excellence in Code (SAFECode) to support the Department of Defense's new Cybersecurity Framework.

2000s

Christine N. Armstrong E'06, assistant district bridge engineer, VDOT, was named a "Top 40 Under 40."

Lisa Burton O'Toole E'07, a graduate of the Thomas Lord Department of Mechanical Engineering and Materials Science, will receive ASME's Kate Gleason Award, honoring women entrepreneurs who make a significant contribution to the engineering community.

As a mechanical engineer, entrepreneur, teacher and mentor to young women, O'Toole is a powerful advocate for innovative women and proudly demonstrates the qualities of Kate Gleason, who joined ASME as its first female member in 1918.

Since her graduation from Duke, O'Toole received her MS and PhD from the Massachusetts Institute of Technology. She serves as executive director of HearstLab, where she evaluates and invests in women-led startups in media, data and technology.

O'Toole was an active ASME student member while an undergraduate at Duke University, receiving the Outstanding Member at the Regional Student Conference in 2005 and ASME academic scholarships for her excellence as an engineering student in 2005, 2006 and 2007.

2010s

Andrew G. Mang E'12, a GCSP Scholar and 2012 Duke graduate with a degree in mechanical engineering and economics, and **Rachael E. Lau E'20**, a Duke CEE graduate and GCSP scholar who is passionate about disaster response and using engineering to improve social well-being, were instrumental in launching a call-to-action by the National Academy of Engineering in April 2020 looking for solutions to the COVID-19 pandemic.

With its Call to Action, the NAE — the most prestigious engineering organization in the country — seeks to create a "virtual incubator of ideas," where a diverse range of engineers can come together to brainstorm ways that engineering could be used to propose and provide solutions to problems that have arisen due to this pandemic. For more information, visit www.nae.edu/230399/National-Academy-of-Engineering-Announces-Engineering-Call-to-Action-on-COVID19.

Mona Dai E'15 is using data to identify unsafe drinking water.

Alison E. Bergmann X'18 was awarded the Society of Women Engineers New Emerging Leader in Technology and Engineering Award this year. There were 15 people in the 40,000-member SWE organization that received this honor.

Ivonna N. Dumanyan E'18 and Gabrielle Levac T'14 started Fathom AI, a company that works with fitness providers to capture user bio data and uses analytics and machine learning to create personalized workouts and recovery plans. ■

In Memory

Duke Engineering Faculty

Rhett T. George, Jr. E'55, 87, assistant professor emeritus of electrical and computer engineering, passed away on December 14, 2020. He was born in Columbia, South Carolina to the late Rhett Truesdale George, Sr. and Gladys Doughty George. George earned his undergraduate degree in electrical engineering from Duke University in 1955 and his PhD from the University of Florida in 1965.

George returned to join the faculty of the then-named Department of Electrical Engineering in 1959. He ultimately served on the department's faculty for 50 years, including a five-year term as assistant dean from 1972-77, until his retirement in 2009. He also served on the Engineering Alumni Council from 1995-1997.

He was a member of McMannen United Methodist Church and was also involved in the Red Cross and the United States Power Squadron. His most passionate hobbies included trains and amateur radio, his radio sign being KE4HIH. A dedicated teacher of generations of Duke Engineering students. Among his Duke colleagues, he is also remembered for his kind nature and the annual "procrastinator's holiday party" he would host at his home each January, inviting the entire ECE department.

Robert M. "Bob" Hochmuth, professor emeritus of mechanical engineering and materials science, passed away on November 13, 2020. Bob Hochmuth served as chair of MEMS from 1986-1994 before retiring in 2004.

An expert in fluid mechanics, heat transfer and thermodynamics, his legacy of scholarship and service are strong and lasting. He is remembered as an outstanding chair, scholar, teacher and wonderful colleague, who had a special sense for identifying, recruiting and supporting talented colleagues.

Hochmuth had a unique career path in the Pratt School of Engineering. Initially he joined the faculty as a professor of biomedical engineering in 1978, where he applied the principles of thermodynamics, and solid and fluid mechanics, to biological problems. He and his colleagues characterized and measured the elastic, viscous and adhesive properties of human red cells and white cells, especially neutrophils. His final work before he retired focused on stretching the individual microvilli that exist on the surface of neutrophils, on extracting receptors from the cell's membrane, and on measuring the forces of attachment between individual receptors and their antibodies. The continuous funding of his work for over two decades by the National Institutes of Health is a testament to its value and impact.

In 1986, he became chair of MEMS, which, as he noted in

contributions to the 1980s tab of the MEMS history web page at mems.duke.edu/about/history, was full-circle for him, because all his engineering degrees were in mechanical engineering. He also shared there his positive experiences with fellow staff and faculty. ■

James Kaiser, who served as a visiting professor in Duke ECE for many years, died Thursday, February 13, 2020, following a brief illness. He was 90 years old. Kaiser is survived by his wife of 65 years, Margo; his children (June, Alan, David, Linda); grandchildren and his brother, Dale. He was preceded in death by his brother John.

Kaiser was born in 1929 in Piqua, Ohio. He attended the University of Cincinnati, where he earned his electrical engineering degree in 1952 and was a brother of the Beta Theta Pi fraternity. He then pursued graduate studies at the Massachusetts Institute of Technology (MIT), earning both his SM and ScD. Kaiser met his future wife while at MIT, where they married and began raising their family. After graduation, they moved to Summit, New Jersey, where Kaiser began his engineering research work at Bell Laboratories in Murray Hill. Kaiser's early work at Bell Labs focused on improving speech signal processing systems and developing filter design algorithms. He authored several key papers on digital signal processing in the 1960s, presenting the idea of the lo-sinh window, which could be used both for digital filter design and spectrum analysis. This window function later became commonly referred to as the Kaiser window. In the 1980s, Kaiser's focus shifted from linear to nonlinear filter design, driven by the need for better voice recognition algorithms. When the Bell System broke up in 1984, Kaiser moved to Bellcore to continue his research. Kaiser had a passion for trying to gain insight into the underlying physics of speech production and recognition and focused his research on modelling the human vocal tract. This research culminated with discovering a new analytic tool he collaborated on with his brother-in-law Herbert Teager, and together they published the foundational papers on what later became known as the Teager Energy Operator.

Kaiser was named an IEEE Fellow in 1973 for "contributions in digital signal processing and the synthesis of digital filters," and received many IEEE honors and awards during the course of his career, including the IEEE Centennial Medal (1984), the IEEE W.R.G. Baker Award (1995) and the IEEE Jack S. Kilby Signal Processing Medal (2000).

After retiring from Bellcore, Kaiser continued being active in the engineering community as a visiting professor at Rutgers University and Duke University.

Being a self- described "number nut," Kaiser approached tasks and duties with precision, yet his love for family was immeasurable and unbounded. As he strived to enjoy each and every day, his eternal optimism, thoughtfulness and appreciation touched everyone around him. ■

James H. McElhaney, the Hudson Distinguished Professor Emeritus of Biomedical Engineering and an integral member of the Duke BME community, passed away on July 30, 2020. McElhaney joined Duke University in 1974, eventually serving as the chair of Duke BME in 1984 and holding the position for 12 years. In addition to playing a major role in the development of Duke BME into a premier, nationally recognized department, McElhaney served as the director of graduate studies in Duke BME, the co-director of the NSF Engineering Research Center, the assistant director of Interventional Cardiac Catheterization in the Division of Cardiology, a professor of experimental orthopedics in the Department of Surgery, and the program director of Duke BME Third-Year Medical Student Research program.

McElhaney is recognized as a distinguished researcher and a founder of the field of biomechanics. His work describing measurements and models of head, neck and spinal cord injury mechanisms has been instrumental in the design of protective football and motorcycle helmets, restraint systems, airbags and swimming pools. This work earned him a variety of awards and recognition, including the titles of national lecturer in the Scientific Research Society, life fellow in the American Society of Mechanical Engineers, and fellow in the American Institute for Medical and Biological Engineering.

During his time at Duke, McElhaney worked with students spanning biomedical engineering, electrical engineering, mechanical engineering, physics, medicine, biology, physiology, chemistry, nursing and zoology. He mentored more than 50 graduate students, supporting them as they found success in academic, industrial and government positions around the world. In 2009, he received the Duke Engineering Alumni Association's Distinguished Service Award for his extensive service and substantial contributions to Duke University, the biomechanics research community and the engineering profession. ■

Paul Wang, professor emeritus of electrical and computer engineering, passed away on January 27, 2021.

Wang served on the Duke faculty for nearly four decades. A native of Fujian Province, China and Taiwan, he earned his BS in electrical engineering from National Taiwan University and an MS in electrical engineering from the University of New Brunswick (Canada) before completing a PhD from Ohio State University in 1965. He served at Bell Laboratories in Communications Systems Research and Modern Control Theory before joining the Duke ECE faculty in 1968.

Wang was an early pioneer in the field of artificial intelligence. He was a prolific and renowned researcher and author in the areas of pattern recognition, image processing, fuzzy logic, mathematics of uncertainty, and intelligent machines. A dedicated teacher, he mentored generations of undergraduate and graduate students in ECE. He also consulted on diverse specialties including advanced fighter planes, naval ship navigation, energy, and highly reliable systems for Duke University Medical Center, Emerson Electric, Grumman, and LORD Corporation, amongst others. He was a board member and advisor to ECE-related companies, as well as an ASEE-NASA Fellow at Langley Space Research Center.

Wang maintained close ties to the ECE department and his beloved Duke University following his retirement in 2005, visiting often to talk with faculty and staff, and traveling extensively to inspire universities around the world to enhance their ECE programs. As professor emeritus, he also remained active in the scientific community, serving as editor of numerous journals, including special issues for the Elsevier journal *Information Sciences,* and managing editor of the journal *New Mathematics and Natural Computation*.

Wang was a kind and generous colleague who will be greatly missed by his many friends in ECE. He will be remembered for his wonderful zest for life—his curiosity about all things, his devotion to his family, and his great passion for history, reading, music, the arts, learning, and education. In 2009, Perkins Library exhibited "Chinese Paintings from the Kingdom of Min" from Dr. and Mrs. Wang's personal collection. A permanent collection of Dr. and Mrs. Wang's academic and literary donations is housed at Jimei University in Xiamen, China.

He is survived by his wife of almost 60 years, Julia Wang, as well as by son Samuel Wang T'86 P'24 (Barbara), grandson Samuel James Wang E'24 and granddaughter Lucia Wang; son George Wang, grandson Carter Wang, and granddaughter Leah Wang. ■

InMemory

Duke Engineering Alumni

William B. Gum E'45 passed away on February 12, 2020.

Walter P. Hardee, Jr. E'49, beloved patriarch, enthusiastic singer, fun-loving jokester, husband and family man, died in August 2020 at the seasoned age of 95 at Springmoor Retirement Community, Raleigh, North Carolina. His spirit, easy nature and good humor will be missed by family, friends and acquaintances near and far who knew him well. Born in Durham in 1925 to Dr. Walter Person Hardee and Florence Rose Hardee, he was baby brother to older sisters Roberta and Margaret (both deceased) and nephew to a long list of Hardee uncles and aunts. Consigned some summers to his grandparents' country homestead in Stem, the story goes, he wandered barefoot, helped with farm chores and snacked on the ever-present sweet potatoes from the warming oven. Walter attended Durham High School, played church league basketball and drove his dad around town to make house calls. His college career was sidetracked by World War II, during which he attended West Point for one year and courted Ethel "Penny" Rothen of Bloomfield, New Jersey. With the war over, Walter, nicknamed "Moon" for his service haircut, matriculated to his hometown's Duke University, married Penny in 1947, started a family, earned a degree in civil engineering and then went on to grad school at Columbia in New York City. First jobs took him to Bluff City (Tennessee), Houston (Texas), Philadelphia (Pennsylvania) and Baltimore (Maryland) where, now a family of four boys (Philip, Chris, Eric and Jonathan), they settled at Three Streams in Cockeysville, MD for 18 years. Additional moves for work took them to Hudson, Ohio and then back to Ruxton, MD, where they settled in for a long period. With children fledged, there was now much travel to touch base with the growing family. In 2006, Moon and Penny looked for a retirement home near one of their children and moved south to Springmoor in Raleigh. A North Carolinian at heart, with Duke blue running through his veins, Walter relished his return to the Old North State and immediately got to work and play at Springmoor, chairing the maintenance committee, growing veggies in the community garden, singing in the chorus, visiting with new friends at meals, playing gin rummy, learning the idiosyncratic slopes of the putting green and polishing his croquet strategy. He didn't like to lose and didn't lose often, not even to the grandkids! He always enjoyed calls, visits, emails and the rare letters from his far-flung boys, their spouses and his grandchildren (Philip and Betty from Asheville (NC), Chris and Susan from W. Chesterfield (New Hampshire), Eric and Diane from Monroe (Washington), and Jon and Pam from Pittsboro (NC)), who served as extraordinary frontline caretakers for 13 years. Big Daddy (as he liked to be called) had eight sparkling grandchildren spread even wider: Rya, Burlington (Vermont); Sarah, Sacramento (California); Jennifer, Sunnyvale (CA); April, Durham (NC); Duncan, Asheville (NC); Toren, New Orleans, (Louisiana); Caitlin, Berlin (Germany); and Cooper, Somerville (Massachusetts). He

InMemory

also had three young great-grandchildren (Samuel, Maven and Liliana) with another on the way. Over the years, family reunions, often raucous, always involved singing, picking and Big Daddy's lonesome harmonica. They were memorable, and we will miss him so! Walter was pre-deceased by Penny in 2015. He is survived by all of his children, their spouses, grandchildren and great-grandchildren, as well as other extended family. To send him off, we share a family toast, a "Moonism," that was always a hit, despite the rolled eyes: "Here's to it and let's do it, and let's do it again. If we don't get to it to do it, we'll never get to it to do it again."

Rhett T. George, Jr. E'55, 87, assistant professor emeritus of electrical and computer engineering, passed away on December 14, 2020. Please see In Memoriam: Faculty for more information.

Michael Swift Bender E'59 passed away at age 82.

Ted S. Levy E'63 passed away in August 2020.

Edward "Towson" Moore G'63, P'95, after a short illness, beloved husband, father, brother, uncle, neighbor and friend, passed away peacefully in his sleep in the early morning hours of January 21, 2020, in Durham, North Carolina. In his final weeks, he was surrounded by his family and supported both near and far by an extensive network of friends and relatives. Towson had a heart of gold that few others in this world could match and was blessed to live an amazing life, full of wonder and love. Many times over the years, especially after the births of his grandchildren, he would stop and marvel at his many blessings in life, telling his family how incredibly lucky he was. Born February 26, 1937, in Wytheville, Virginia to Robert Brent Moore and Jane Oewel Moore, he was a Virginia farm boy at heart, but at a young age he developed a passion for electricity that never left him. He went to Virginia Tech and was a proud member of the Corp of Cadets and a high jumper on the varsity track team. He was an Army veteran, serving at Aberdeen Proving Grounds. He attended Duke University graduate school, where, under the tutelage of Dr. Tom Wilson, he became Duke University's first recipient of a PhD in electrical engineering. Following graduate school, he embarked on a new adventure with his college professor, Dr. Wilson, together founding Wilmore Electronics, Inc. in 1963. Towson spent the rest of his career devoting his time and creative energy to the flourishing of Wilmore. He found great joy in designing and developing electrical power equipment that now provides reliable service in the energy, utility, vehicular, data communications and railroad industries in both the United States and in more than 20 foreign countries. The Wilmore community was like a second family for him, and he cared deeply about everyone there. The creation of Wilmore brought him decades of purpose and a way to make a difference in society and to better the lives of others.
He served on the board of the regional Goodwill Industries, serving as the chairman of its Board of Directors, and was a member of the Board of Trustees for Durham Technical Community College. He also served on Durham Tech's Foundation Board and on the Industrial Advisory Committee to its Electronics Technology Program. He was inducted into Virginia Tech's Academy of Engineering Excellence in 2005. Happily for all of us, when he was in graduate school, the librarian of the engineering library introduced Towson to the love of his life, Linda Lunsford, an English teacher at Durham High School and later at Northern High School. Married in 1965, they had two children and for 54 years have led a life of goodness, steadfastness and joy, including many trips saltwater fishing, skiing at Lake Gaston, hiking the wilds of Montana, playing tennis and golf, and enjoying Sunday dinners with their family. His kindness and smile will be forever missed, but we are so grateful for the decades of boundless love, the life lessons he imparted and the amazing adventures we shared. Towson is survived by his wife, Linda; son, Alan (Patty); daughter, Jennifer; grandson, Nathaniel; and granddaughter, Violet. He is also survived by his two brothers, who were two of his best friends, Charles Moore (Mary Lea) and Brent Moore (Connie).

C. Frederick Rolle E'63, P'01 passed away on December 27, 2019.

Malathi Veeraraghavan G'85, G'88, professor of ECE at University of Virginia, passed away May 11, 2020. She was an ECE PhD alumnus (1988), a former student of Kishor Trivedi. She had a wonderful career, first at Bell Labs, then as a professor at New York University and UVA. She was a fellow of IEEE. ■

Will Senner

Dear Duke Engineering Alumni:

The year of 2020 was, of course, in almost every way, not what any of us imagined it would be. Despite the many challenges, I am incredibly proud of the work of our Engineering Alumni Council to adapt and press forward with meaningful programs to support our alumni, our current students and our school.

Our mentoring program has continued to grow, reaching over 600 alumni and students this year, making it one of the largest of its kind across any school or unit at Duke. Most importantly, our alumni continue to show overwhelming commitment to connecting with and supporting our students during this period, which is incredibly difficult for so many. Even the most simple conversations can be immensely impactful right now. I cannot say thank you enough to all the alumni who have given their time.

"I've participated in the Pratt mentoring program the past two years and had a great experience both years. Last year I was matched with Gabe Tsuboyama, and we've developed a close relationship that eventually led to a partnership with the company I will be working at post-grad and Gabe's firm. This year I was matched with Carlos Obando, and he's already given me some timely and relevant advice about post-grad opportunities for an engineer. I wanted to say thank you so much for organizing this fantastic program."

—CONNOR PASSE, senior studying mechanical engineering

Some of our most successful programs, such as TAPA Talks and our Resume Review/Mock Interview sessions, have moved to an online platform and been incredibly well received. Thank you to everyone who participated in these programs, whether as a speaker, an interviewer or just behind the scenes helping make it happen.

There is a lot to look forward to in 2021 and beyond, and Duke Engineering is no exception. We welcome the opening of the beautiful new Wilkinson Building that greatly expands the school's research and teaching capabilities, as well as an impressive new Quantum Computing Center in the Chesterfield Building in downtown Durham. You will also soon hear more about Pratt's 2039 Plan, a distinctly Duke vision for the future of the school, which includes a focus on growing and developing alumni engagement as one of its core principles. And of course, last but not least, we welcome a new EAC President, Tracy Nickelsburg E'88, P'22. Tracy has been a member of the council since 2013 and an integral member of our executive committee since 2018. I cannot wait to see all the great things the EAC accomplishes under her leadership in the coming years.

Those of you who know me know that I might occasionally geek out on data and might occasionally (obsessively) listen to Stephen Dubner's Freakonomics Podcast. In the last year, he has closed his podcasts with a slightly different message, which I will borrow here:

Take care of yourselves, and if you can, someone else too.

Will Senner, E'06, MEM'06
President, Engineering Alumni Council

The **Annual Fund**

The Annual Fund helps support need-based scholarships so that Duke Engineering can attract the best students, recruit and retain world-class faculty, and support student clubs and activities that sometimes wind up changing lives or setting world records. It also helps provide experiential learning to our students through programs such as our First-Year Design course, the Pratt Research Fellows and the Duke Biomedical Engineering Fellows.

The benefits of the flexible, unrestricted support Duke Engineering receives from Annual Fund gifts could not have been clearer once COVID-19 transformed life for the country and for Duke. During this time of transition and new realities, the Annual Fund was a resounding reminder that Duke is supported by dedicated individuals committed to standing together, which not only furthers our important missions of education, research and service, but makes a real difference in the lives and success of our students.

But don't take our word for it. Here are just a few examples of how the Annual Fund has touched the lives of Duke Engineers over the past year. Written for *My Duke Year* by Morgan McCloud E'23 and Philip Liu E'22, these Duke Annual Fund student ambassadors provide an authentic voice and key insights into student life at Duke.

Please consider giving to the Annual Fund—its importance on the Duke experience has never been more clear.

Pratt School of Engineering
Development & Alumni Affairs

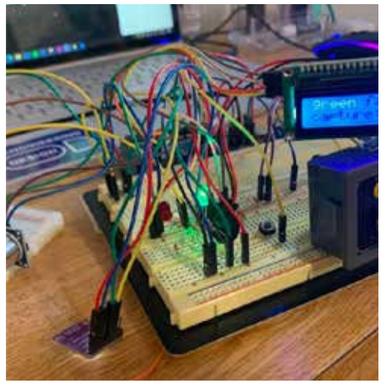
Support Your Annual Fund

There are several ways you can make a gift before June 30th:

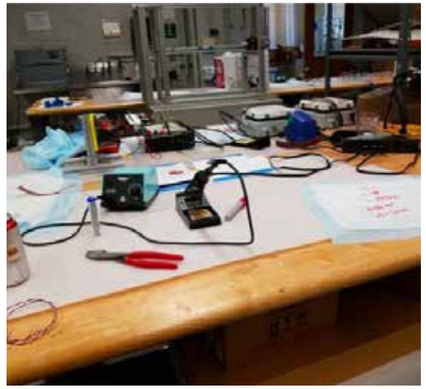
*1. **CALL** the Pratt School of Engineering with your gift, 919-660-5385 (main),*

*2. **ONLINE** at www.gifts.duke.edu/pratt,or*

*3. **MAIL** your gift to: Pratt School of Engineering, Duke University, Box 90271, Durham, NC 27708.*



"In BME244 we learned how electrical impulses travel down muscle fibers and for one of the labs, we tracked how fast a muscle twitch moves down our own arms and used that data to visualize the material we were learning in lecture. In the picture, you can see me wired up to the shock machine (ouch!). Luckily this class offered an in person section where I got the opportunity to (safely) experience the very hands on labs." - **MORGAN MCCLOUD**



"With remote learning, my engineering classes have done a great job of transitioning labs and curriculum to become remote! While lectures remain on Zoom, some classes have provided small, take-home kits to complete assignments. At the start of this semester, other labs were able to be conducted in person (at limited capacity and adhering to the Duke Compact)." - **PHILIP LIU**

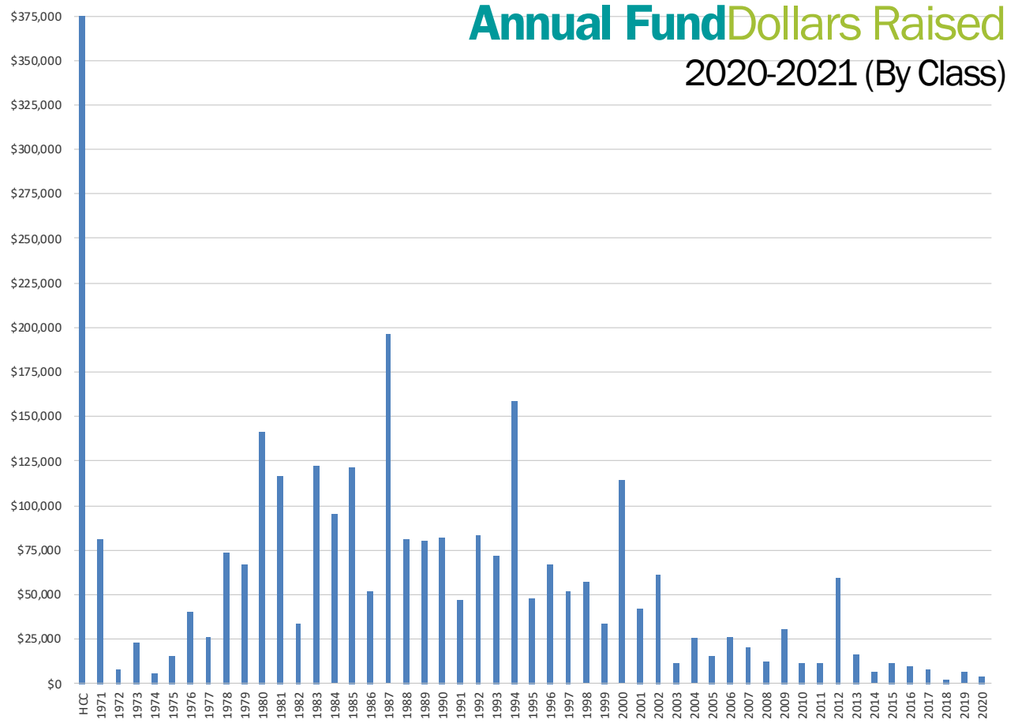
CLOCKWISE: *To learn about pressure vessels (and related concepts like stress, strain, Young's modulus and Poisson's ratio), our ME 321 lab is calculating the internal pressure on a soda can. Here is the socially-distanced lab equipment for the soda can lab.*

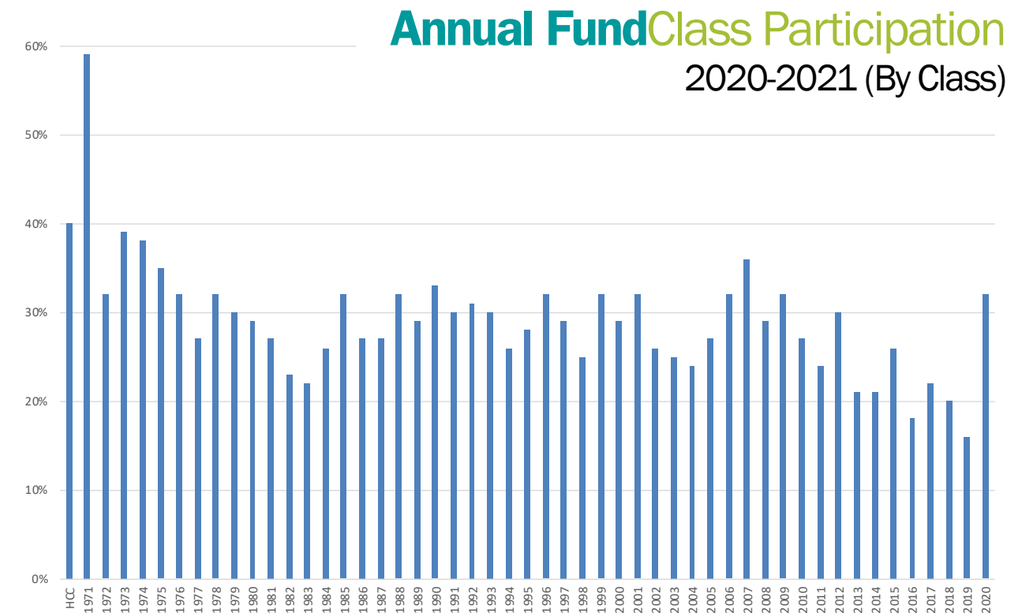
This soda can surface was prepared before being attached with a strain gauge. We're finishing it up after the stay-in-place order is over!

To practice soldering in ME 321, we were all given a take-home soldering station and radio kit to assemble.

Annual Fund Campaign

CLASS	GOAL 2020-2021	Dollars Raised 2019-2020	PARTICIPATION 2019-2020	% Participation Goal 2021-2022
HCC	$640,000	$631,377	45%	40%
1971	$100,000	$80,879	65%	59%
1972	$12,000	$8,470	49%	32%
1973	$24,000	$23,140	41%	39%
1974	$6,800	$5,435	43%	38%
1975	$16,000	$15,365	40%	35%
1976	$41,500	$40,394	40%	32%
1977	$26,500	$26,224	35%	27%
1978	$75,000	$73,862	40%	32%
1979	$68,000	$66,551	38%	30%
1980	$142,000	$141,845	35%	29%
1981	$125,000	$116,718	40%	27%
1982	$35,000	$33,832	35%	23%
1983	$123,500	$122,805	32%	22%
1984	$97,000	$95,390	37%	26%
1985	$123,000	$121,798	35%	32%
1986	$60,000	$51,783	38%	27%
1987	$196,000	$195,908	35%	27%
1988	$81,000	$80,865	45%	32%
1989	$81,000	$80,356	39%	29%
1990	$82,000	$81,574	36%	33%
1991	$50,000	$46,982	41%	30%
1992	$84,000	$83,440	38%	31%
1993	$72,000	$71,623	36%	30%
1994	$159,000	$158,877	36%	26%
1995	$49,000	$48,189	35%	28%
1996	$70,000	$66,750	42%	32%
1997	$52,000	$51,951	39%	29%
1998	$58,000	$57,130	35%	25%
1999	$35,000	$34,151	37%	32%
2000	$115,000	$114,554	35%	29%
2001	$46,000	$42,304	40%	32%
2002	$62,000	$61,160	33%	26%
2003	$12,000	$11,152	32%	25%
2004	$26,000	$25,430	34%	24%
2005	$16,000	$15,569	37%	27%
2006	$30,000	$26,730	42%	32%
2007	$21,000	$20,932	50%	36%
2008	$13,000	$12,688	40%	29%
2009	$31,000	$30,381	41%	32%
2010	$12,000	$11,157	35%	27%
2011	$20,000	$11,323	40%	24%
2012	$59,500	$59,260	38%	30%
2013	$17,000	$16,351	30%	21%
2014	$7,000	$6,807	32%	21%
2015	$12,000	$11,195	33%	26%
2016	$12,000	$10,161	38%	18%
2017	$9,000	$8,111	27%	22%
2018	$2,600	$2,481	30%	20%
2019	$6,700	$6,529	30%	16%
2020	$4,000	$3,960	50%	32%
2021	$1,200	$0	60%	32%
Alumni	$3,319,300	$3,221,899	38%	36%
Parents and Friends	$680,700	$1,035,938		
Total	$4,000,000	$4,257,837		





Honor Roll 2019-20

Recognizing Leadership Giving

Each year, leadership contributions represent more than 75 percent of the Annual Fund's cash total. These gifts provide the university with flexible resources to support a wide range of important needs.

In recognition of these generous donors, Duke has established a number of leadership gift clubs. Membership is renewable annually and is based on Annual Fund gifts made or facilitated by the individual and his/her spouse. Corporate matching gifts count toward membership if received or verified within the fiscal year.

Duke Annual Fund Leadership Giving Societies

President's Society
- Executive Cabinet $100,000+
- Cabinet Member $50,000-$99,999
- Executive Council $25,000-$49,999
- Council $10,000-$24,999

Washington Duke Society
- Partner $5,000-$9,999
- Fellow $2,500-$4,999
- Member $1,000-$2,499

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$100,000+

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1981 Ms. Martha Lee Monserrate #^
1994 Mr. Michael James Bingle #^

Parents and Friends

Mr. Anthony and Mrs. Mary Barra P'19, P'21 #
Mrs. Eryn Ament Bingle #^
Mrs. Constance Elaine Chambers #^
Mr. Herbert Hardinge McDade III T'81 #^

President's Society Cabinet
$50,000 - $99,999

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1966 Mr. Thomas E. Harrington #*
1971 Mr. John T. Chambers #^*
1981 Ms. Martha Lee Monserrate #^
Mr. Jeffrey N. Vinik #^*
1984 Mr. Kenneth Thomas Schiciano #^*
1987 Mr. Lawrence D. Lenihan, Jr. #^

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Mrs. Susan Harrington #^*
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Mr. Herbert Hardinge McDade III T'81 #^
Mrs. Elizabeth Pixley Schiciano P'21 #^*
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Mrs. Laurette and Mr. Seymour Sternberg P'08 #^
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1973 Mr. William J. Hanenberg #
1980 Mr. James D. Heerwagen #^
Mr. Timothy P. Rooney #^
Mr. David S. Taylor #
Mr. Eric James Schiffer #
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Mr. Dimitri Edward Zarboulas
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Mrs. Stacy L. Pineles #

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Mrs. Patricia Lister Hanenberg P'04 #
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Mrs. Anna Oates Skudlarick
Estate of Ralph F. Spinnler #
Mrs. Marsha Hellard Taylor P'10, P'14, P'16 #
Mrs. Beverly Anne Wilkinson P'98, P'00, P'03 #^*

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$10,000 - $24,999

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Mr. George H. Crowell #
1968 Mr. Russell L. Schoudt
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Mr. Daniel M. Dickinson #^
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1985 Mr. David Lloyd Pratt #
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1986 Mr. Russell Monroe Glass

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PRATT SCHOOL OF ENGINEERING

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To better recognize our consistent donors, their names are denoted in bold for five years of consecutive giving. For those who graduated less than five years ago their names will also be in bold if they have given each year since graduation. Finally, to recognize consecutive giving over the years, we are placing the number of years you have supported the School in parenthesis next to your name. We will update the list each year to continue recognizing our loyal alumni. THANK YOU, THANK YOU, THANK YOU!!!

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363 Donors/ 909 Class Roll
40% Participation

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Robert W. Ross (29)
J. Lee Sammons (30)
Howard C. Shaffer III (2)
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David E. Thomasson (1)
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Turner Whitted (21)
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Edward J. Doyle, Jr. (1)
Alan G. Goedde (29)
Clifton C. Hickman (4)
William R. Impey (7)
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David T. Simmons (1)
Robert K. Smith (11)
Richard S. Taylor (30)
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59% Participation
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James W. Davis (13)
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David W. Erdman (30)
Ted K. Field (30)
Glen M. Gallagher (30)
Vance D. Gregory, Jr. (27)
J. Bill Hanson (30)
R. Reeves Hayter (9)
John H. Hebrank (12)
Donald M. Helfer (30)
Jack C. Holland (28)
Michael D. Jones (23)
Thomas R. Kagarise (7)
Allen J. Kasden (2)
Brian H. Kennedy (11)
Chun H. Lam (30)
David G. Marcelli (1)
John S. Marold (30)
Thomas H. Medlin (30)
Hunter Moricle (25)
George T. Muller (8)
Robert F. Olivere (1)
Michael C. Parrott (30)
Douglas S. Perry (12)
William R. B. Potter (30)
Curt A. Rawley (21)
Peter R. Romeyn (30)
John H. Rudd (30)
Charles G. Sandell (3)
William B. Seith (3)
Charles M. Skinner (16)
Duane Southerland, Jr. (30)
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Allen F. Suit (30)
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Thomas L. Warren (30)
George J. White (27)
Robert S. Willig (15)
Phillip S. Wilson (6)

Class of 1972
22 Donors/ 68 Class Roll
32% Participation
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Daniel A. Dell'Osa (26)
George D. Graham (11)
Donald P. Halsey III (3)
Joseph A. Harland (24)
Tedd H. Jett (30)
Ervin H. Kelman (14)
Murray A. Korn (1)
Robert Y. Li (11)
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William D. Needham (22)
John H. Nicholson III (16)
Royden P. Saffores (13)
Alan D. Sherwood (30)
Giles W. Vick III (10)
Gerald R. Whitt (11)

Class of 1973
33 Donors/ 84 Class Roll
39% Participation
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Joseph C. Bates III (30)
Henry P. Betz (30)
Walter J. Bishop (22)
Robert S. Bogan (1)
John J. Borgschulte (12)
Peter A. Bozick (15)
Robert B. Brower (30)
George Clarke (1)
William E. Cowart (21)
Dewey J. Cunningham (6)
Mark C. Davis (10)
John G. Dudley (30)
John F. Dunlap (1)
Donald W. Goodman (12)
William J. Hanenberg (25)
Edward R. Harback (7)
Charlotte S. Harman (22)
Ozey K. Horton, Jr. (30)
Glenn D. Jordan, Jr. (10)
Kenneth W. Lumsden (11)
Charles T. Lunson (1)
Kenneth W. Marinak (9)
Frederick E. Munschauer III (5)
James B. Nicholas (17)
Donald R. Riekert (2)
Randall J. Rost (6)
Blair B. Sanders (18)
Joseph H. Schmid (2)
Warren B. Shaw (13)
James A. Strycharz (2)
Paul A. Vadnais (11)
David H. Watts (30)

Class of 1974
28 Donors / 74 Class Roll
38% Participation
John P. Ankrum (8)
Dwight S. Aston (28)
R. Jack Bowers III (30)
Clyde R. Butler, Jr. (10)
John W. B. Curtis (19)

Annual Fund

Robert E. Fraile (29)
Robert A. Hyde (22)
Bruce Klitzman (29)
James E. Krekorian (28)
Carl E. Lehman, Jr. (24)
John M. Logsdon (28)
James F. McAlister, Jr. (30)
Stephen J. Montgomery (1)
Mark W. Reinhardt (1)
David E. Thomas (6)
Philip W. Thor (2)
David T. Troyan (4)
D. Mark Upham (13)
Stephen A. Van Albert (11)
Philip H. Vorsatz (13)
Samuel S. Waters IV (9)
Stephen L. Whiteside (7)
J. Erby Wilkinson (16)
Blake S. Wilson (5)
Ray L. Wooten (30)

Class of 1975
35 Donors/ 99 Class Roll
35% Participation

Athanasios Aridgides (14)
Peggy L. Asplund (24)
David G. Autrey (3)
Mark E. Baldwin (25)
Montford W. Bryant (23)
Timothy M. Byess (4)
Hugh G. Chilton III (1)
Wade T. Cooper, Jr. (1)
Frank J. Coulter, Jr. (30)
Patricia T. Crisenbery (8)
Tyler Dawson (9)
Donald J. Ennen (30)
David B. Epstein (23)
William C. Fletcher, Jr. (1)
Michael A. Freeman (21)
John C. Garvey (13)
Frank W. Gayle (21)
Kenneth E. Gerlitz (2)
Michael L. Halladay (30)
James E. Higgins (5)
John A. Hornaday, Jr. (10)
Kent C. Hustvedt (17)
Martin R. Meyer, Jr. (21)
Cory D. Rind (21)
Jerry C. Ruddle (1)
Alan K. Schuler (23)
William L. Shoemaker (29)
Bruce D. Sterrett (2)
R. Gregory Stortstrom (30)
Arthur H. Symmes (1)
David Ullmann (21)
Peter W. Waxter (19)

Class of 1976
30 Donors/ 95 Class Roll
32% Participation

Edward Anapol (30)
Kent M. Baldwin (1)
Lawrence C. Caldwell (22)
Laurie C. Conner (20)
Peter J. Deutch (10)
Robert E. Donaho (29)
Neal J. Galinko (30)
Philip J. Hawk (29)
William A. Hawkins (23)
Stuart J. Heyman (30)
George A. Irwin (2)
Dwight T. Kernodle, Jr. (4)
Kenneth R. Maples (26)
Gordon E. Melville (3)
Betsy Miller-Jones (22)
Stockton Miller-Jones (22)
DeWitt A. Nunn, Jr. (28)
Lawrence D. Osborne (4)
Margery F. Overton (7)
Curtis M. Pearson (18)
Bayard L. Powell (30)
Thomas C. Rearick (3)
William B. Scantland (10)
James M. Snyder, Jr. (6)
Edward T. Stockbridge (30)
Dennis M. White (18)
Robert K. Willet (30)
J. Grafton Withers (10)
William A. Worrell (19)

Class of 1977
32 Donors/ 120 Class Roll
27% Participation

M. Scott Albert (16)
Steven C. Bartolutti (26)
Jeffrey D. Blauvelt (16)
Philip C. Buescher (17)
Doug S. Doores (16)
Stephen K. Y. Eng (21)
Robert L. Galloway, Jr. (1)
George D. Gehrett (15)
G. Robert Graham (30)
Bruce W. Hoffman (24)
Keiko Hsu (5)
Robert T. Hyatt (24)
Kenneth B. Keels Jr. (4)
Robert T Kraemer, Jr. (13)
William H. Lamason II (24)
Robert G. Leech (30)
David H. Llewellyn (17)
Mary Z. Luckenbaugh (4)
John D. Millan (1)
George E. Murphy (30)
Richard M. Prevatt III (18)
Thomas F. Rahlfs (2)
Janis J. Rehlaender (30)
W. Russell Scheirman II (17)
Eliot D. Shook (3)
David P. Spearman (30)
David B. Stewart (1)
Collier T. Weiner (2)
Edith Wilson (1)
Paul M. Wilson (1)
Cliff A. Younger (30)

Class of 1978
45 Donors/ 139 Class Roll
32% Participation

Elise T. Atkins (30)
Victoria S. Bell (25)
Melton C. Bost (12)
Banks J. Clark (25)
Herman Cone, III (28)
Jonathan P. Eagle (10)
Kristine E. Ensrud (1)
David S. Enterline (15)
James B. Ferguson III (12)
Eric L. Ferraro (10)
Brian F. Gaston (11)
Ella M. Gipson (5)
Michael L. Gollobin (6)
Dale T. Guidry (27)
Richard A. Henrikson (19)
Jeff H. Hinson (3)
Joseph G. Hitselberger, Jr. (10)
Lisa G. Hoffman (25)
Henry Kent Holland (19)
John G. Hovis (11)
Alison Ives (29)
Jeffrey D. Ix (30)
Joe M. Kellis (10)
Robert A. Kilpatrick (1)
Robert A. Kusnetz (2)
Carolyn C. Leech (30)
Brenda H. Letzler (3)
James C. Lordeman (30)
Rebecca Lula (24)
Michael E. McConnell (1)
Pamela R. Moore (19)
Lisa S. Orton (19)
Elizabeth D. Peloso (30)
Ronald L. Sapio (10)
Stephen B. Slawson (30)
B. Davison Smith, Jr. (7)
Randall T. Smith (19)
C. Thomas Stuart, Jr. (25)
John A. Towers (1)
Jackie Walker (20)
Shao F. Wang (13)
Gregory S. Wolcott (29)
Richard G. Wolfe (4)

Class of 1979
43 Donors/ 143 Class Roll
30% Participation

Michael W. Alston (23)
G. Andrew Bauer III (2)
Richard A. Beck (5)
Cynthia N. Brooks (30)
Carol D. Burk (5)
Beth R. Caron (7)
Jill S. Cobbs (4)
Douglas E. Farst (22)
Wilson M. Fraser, Jr. (1)
Betsy J. Frauenthal (23)
Albert N. Gore III (4)
Alden Hart (20)
James D. Huey (1)
Kathleen D. Ix (30)
Helen Krauss (3)
Donald K. Lee (27)
Michael Lorusso, Jr. (24)
Joseph M. Luchetski (30)
Joan L. Marks (30)
Douglas A. McGraw (27)
Scott F. Midkiff (10)
John Milner, Jr. (30)
Jay A. Nadel (25)
Jonathan Norton (21)
Richard B. Parran, Jr. (23)
Bradley S. Perkins (2)
Michael T. Plantamura (11)
John W. Rathke (2)
Cristian M. Rodriguez (2)
David M. Savard (28)
Alvin J. Sill III (30)
Laurence S. Sloman (4)
Stephen R. Spector (30)
Julia L. Stevens (4)
Charles A. Tharnstrom (1)
Jonathon D. Truwit (2)
Howard O. Watkins III (3)
Bradley G. Watts (30)
R. Davis Webb, Jr. (30)
Ronald C. Wong (5)
Nicholas Zaldastani (8)

Class of 1980
53 Donors/ 181 Class Roll
29% Participation

Nancy E. Alston (23)
Katherine Andriole (17)
Clinton C. Bennett III (25)
Robert K. Brandt (10)
Scott A. Brandt (10)
Michele M. Carbonell (17)
R. Gregg Caro (1)
Robert S. Conway (3)
David O. Cook (30)
Brockton R. Ellwood (6)
Thomas H. Flournoy (13)
Linda S. Floyd (28)
Tench C. Forbes (3)
Marla J. Franks (30)
Linda J. Gabbard (3)
William M. Gilliland (9)
James D. Heerwagen (1)
John G. Holland (13)
Robert D. Huang (6)
Mary P. Jordan (1)
Andrew L. Kirby (30)
William F. Larson (7)
Walter M. Livingston (1)
Steven T. Maher (10)
Beverly Marson (20)
Donald T. McComas (2)
Donald B. McGonigle (26)
Donald C. Mikush, Jr. (19)
Jeffrey W. Miller (3)
David W. Molter (2)
Paul R. Moulton (30)
David Munnikhuysen (22)
Nancy J. Pelc (21)
Jeffrey W. Reedy (25)
Christopher M. Relyea (30)
Timothy P. Rooney (1)
Mack T. Ruffin IV (30)
Andrew E. Scherer (30)
Cheryl S. Sourbeer (6)
Jonathan B. Sourbeer (6)
Dale R. Stanton-Hoyle (19)
Lisa F. Stilwell (11)
Douglas B. Strott (1)
Joseph M. Szewczak (4)
David S. Taylor (5)
Cynthia P. Walden (23)
Warren R. Weber (17)
Marc D. Weinshenker (28)
Richard E. Williams (24)
Craig A. Witt (23)
Kyle S. Witt (23)

Class of 1981
47 Donors/175 Class Roll
27% Participation

G. Daniel Adams, Jr. (11)
Richard L. Aicher (9)
John W. Allison (1)
Amjad A. Bseisu (10)
Joel W. Burdick (1)
Sara E. Bures (10)
Patricia S. Byrne (5)
Kwokming J. Cheng (6)
Alan R. Cohen (9)
Laura S. Foulk (1)
Edward F. Hendershot (25)
Craig S. Henriquez (2)
Deborah J. Herts (10)
William A. Huting (6)
Cynthia D. Kaiser (8)
Patrick J. Keegan (30)
Mark J. Keister (10)
Brian S. Kelleher (9)
Simon Y. C. Lau (2)
Perry H. Leo (21)
Alvin F. List III (1)
Linda W. H. Mackie (30)
Carl E. McCants (21)
Eugene D. McGee (3)
Michael A. McGlockton (3)
James B. McIlvain (26)
Nicholas I. Morgan (19)
Laurent Nicolov (2)
Laura S. Nystrom (29)
Richard W. Pekala (30)
George S. Plattenburg, Jr. (26)
Louise C. Riddle (18)
Thomas B. Robey (24)
David I. Rowland (17)
Caroline S. Schlaseman (30)
Joseph P. Sherman (5)
Janet L. W. Slagle (11)
Craig J. Soloff (23)
Armando A. Tabernilla (29)
Vestal C. Tutterow (28)
Gordon B. Van Dusen (5)
Jeffrey N. Vinik (5)
Michael S. Wainer (30)
Janet M. Weber (13)
Edward H. Wright (4)

Class of 1982
41 Donors/182 Class Roll
23% Participation

Anne F. Ayanian (3)
John W. Barton (26)
Alan R. Blankshain (7)
Danal A. Blessis (21)
John A. Board, Jr. (28)
J. Jon Brophy (4)
Carolyn N. Chase (30)
Christopher B. Cook (30)
Becky A. Cuthbertson (16)
Kevin E. Flynn (21)
Elizabeth A. H. Fortino (10)
Jane W. Gezon (4)
Virginia T. Gibbs (10)
Scott D. Greenwald (12)
John C. Hausman III (16)
Akiko Hayashi (14)
Steven P. Hayes (30)
Catherine L. Iacobo (17)
Mark R. Jeffers (23)
Pamela C. Jenkins (6)
Mark B. Kadonoff (23)
Dori A. Klass (5)
Bruce T. Kroeschell (30)
Mary Josephine R. Lee (4)
Howard I. Levy (16)
Barbara C. McCurdy (21)
Bruce A. McDermott (2)
William R. Mendez (15)
Thomas A. Natelli (15)
Charles M. Nobles, Jr. (1)
Lisa Z. Olens (26)
Laura L. Philpot (1)
Susan B. Ross (15)
Kenneth G. Sandberg (24)
Mitchell J. Shein (14)
Peter T. Tucker (22)
Gunnear W. Zorn III (1)

Class of 1983
43 Donors/ 194 Class Roll
22% participation

Lillian P. Baldwin (6)
David M. Bennett (3)
Ivan L. Blinoff (18)
Farley W. Bolwell (18)
Robert C. Bourg (25)
James S. Carter (30)
Jay Cavanaugh (1)
J. Mark Dennis (18)
Daniel M. Dickinson (26)
Robert J. Ferrall (13)
William J. Florence III (7)
Jean D. Franke (1)
Graziano D. Giglio (21)
Allison H. Glackin (30)
Daniel J. Griffith (30)
Boris I. Ilicic (19)
Elizabeth T. Jolly (7)
Bart R. Kessler (26)
Mark Kitchens (20)
David E. Korn (30)
Cynthia L. Manieri (30)
John M. McDonald, III (28)
Nicholas J. Naclerio (1)
Alan K. Novick (16)
David S. Orlin (6)
Elizabeth S. Owen (29)
David R. Pitser (30)
Letitia E. Roe (11)
Steven C. Rosner (3)
John L. Russell (10)
Eric J. Schiffer (13)
Allan B. Shang (11)
Deborah T. Simpson (1)
David M. Strickland (30)
James P. Toomey (12)
Joseph B. Wood, III (24)
Harold L. Yoh, III (30)
Rebecca P. Zayatz (3)

Class of 1984
56 Donors/ 218 Class Roll
26% participation

Bruce J. Andersen (26)
Kym T. Bean (25)
Benjamin C. Bonifant (11)
K. Monroe Bridges (1)
Andrew M. Brown (12)
Pinetta J. Bruce-Brookes (5)
Marjorie G. Bryen (12)
Susan F. Bueti (5)
Laura G. Bulson (5)
Karen B. Callard (2)
Elizabeth A. Carter (7)
John Chae (9)
Andrew Cowan (21)
Thomas F. Dziwulski (17)
Jeffrey S. Ebeling (30)
Kevin J. Fellhoelter (7)
Omar Ghattas (14)
Daniel R. Gilmore (29)
Leonard Ray Goldfarb (18)
Michael S. Good (3)
David J. Gregory (16)
R. Campbell Hewell, Jr. (7)
Antoinette T. Iacobo (2)
Julie A. Keenan (25)
Joel C. Kent (6)
Gregg G. Kowalski (1)
Andrew J. Lawson (22)
Richard B. Lazarus (22)
Wah K. Lee (12)
Page I. Lemel (30)
Samuel M. Liang (28)
Alain G. Magro (18)
Peter F. McIlveen (4)
Carolyn O. Molthrop (14)
Corell L. Moore (22)
David H. Moore (25)
Reginald K. Moore (4)
Nicolette B. Naso (30)
Sarah D. Norton (1)
Prayson W. Pate (1)
Amy A. Petersen (30)
Walter M. Petroll (12)
Dean W. Pletz (13)
Dawn K. Pratt (30)
Raymond R. Rackley (7)
Scott H. Robinson (12)
Robert W. Rooks (2)
Kenneth T. Schiciano (28)
Gary J. Smerdon (2)
David R. Smith (23)
Christopher T. Wilde (27)

Class of 1985
70 Donors/ 219 Class Roll
32% Participation

Matthew D. Bacchetta (21)
Belinda A. Bacon (17)
Peter T. Baker (7)
Christopher J. Bedell (28)
Jeffrey D. Behrens (5)
Paul G. Bernhard (22)
Stephen R. Bolze (23)
Susan A. Botyrius (1)
Dale L. Brunelle (13)
Richard G. Bryan (2)
Karen E. Conover (9)
Michael J. Cooney (4)
Marietta J. Costa (3)
Michael G. D'Antonio (24)
Aileen M. De Soto (11)
Kevin A. Dorsey (16)
Richard A. Ferguson (18)
Scott P. Gatje (30)
Stuart M. Gaynes (24)
Bryan C. Gee (23)
Jane L. Gerb (21)
Lynn V. Gilbert (1)
Charles A. Gove (19)
Sarah M. Greifenberger (1)
J. Joseph Handley (1)
Michael P. Hebert (2)
Warren S. Hilton (6)
Bradley D. Johnson (4)
Craig E. Jones (11)
Anand D. Kasbekar (23)
Bennett S. King (16)
Felix D. Klebe (8)
Kenji A. Kojima (7)
Michael A. Korman (1)
Roman M. Kowalchuk (26)
Scott Kresge (4)
Stuart J. Laidlaw (1)
Michael C. Lenz (5)
Jean G. Levett (30)
Tanya J. Lind (11)
Darren K. Maness (21)
Marie L. Marchesseault (7)
Paul M. Matsumura (28)
Nelson E. Matthews, Jr. (4)
Marybeth McGinn (21)
Kevin B. Nace (30)
James R. O'Connell, Jr. (20)
Debra M. Parrish (13)
John L. Penvenne (13)
Timothy D. Pettit (23)
Richard J. Pond (18)
David L. Pratt (29)
Henry M. Quillian III (6)
Douglas S. Rex (9)
Robert E. Robinson, Jr. (18)
Kevin D. Romer (1)
Barry E. Schneirov (30)
Jeffrey S. Spear (19)
Ledi S. Trutna (27)
Beth Urdahl (21)
Peter W. Waring (11)
Spencer W. White (22)
Kemp B. Wills (23)
Roni H. Wolfe (2)
Michael T. Yamamoto (22)
Michael H. Yoh (1)
Dimitri E. Zarboulas (3)
Orest B. Zborowski (6)

Class of 1986
59 Donors/ 221 Class Roll
27% Participation

Samuel M. Al-Aish (3)
James E. Albright (4)
Scott J. Arnold (11)
Jun Asai (28)
Deborah R. Behrens (5)
David P. Boch (30)
Lewis C. Brewster (5)
Elizabeth P. Brosnan (2)
Jacqueline E. Brown (3)
Curt A. Cimei (15)
Thomas C. Daily (20)
David T. Dellaero (6)
Linda S. Ermides (10)
Gregory A. Esses (13)
Jon R. Fahs, Jr. (10)
George A. Fang (3)
Allen H. Farrington (18)
Peter W. Flur (30)
Gary W. Geck (11)
Sam A. Ghazaleh (23)
Richard M. Greenwald (21)
Julie H. Grill (25)
Jonathan M. Guerster (30)
Kurt W. Haas (11)
Robert J. Harward (11)
Aric J. Keller (4)
John M. Kuttler (13)
Lawrence J. Lang (1)
Stacy E. Lawson (4)
Kenneth B. Lazarus (17)
Robert S. LeVine (30)
David S. Lindquist (3)
Jane F. Mashiko (15)
Douglas M. McCracken (10)
Thomas C. McThenia, Jr. (7)
Michele H. Miller (30)
Mark M. Murray (12)
Amy M. Novak (4)
Roberta G. Oyakawa (1)
Daniel E. Paul (1)
Mark A. Potsdam (30)
Thornton F. Prayer (1)
Michael L. Rigsby, Jr. (1)
Steven B. Royster (3)
Judith B. Schmitz (12)
Robert F. Shuford, Jr. (20)
Dee M. Stewart (26)
Steven K. Stranne (2)
Elias J. Torre (30)
Billie S. Walden (11)
Paul A. Wiese (2)
Kristen L. Zakian (5)

Class of 1987
53 Donors/ 196 Class Roll
27% Participation

Douglas C. Allen (3)
Henrik Bacho (7)
Richard C. Brown (24)
Brenton E. Bunn (20)
Paul Chae (3)
David Ciaffa (20)
Celine J. Crowson (3)

Annual Fund

J. Jefferson Dean (1)
James L. Dolan (5)
Karim S. El-Fishawy (6)
Marc J. Falleroni (3)
Steven F. Fields (3)
Cameron H. Fowler (27)
Kenneth A. Fox (17)
Laura B. Graham-Ford (14)
Charles A. Grandy (13)
Suzanne M. Gregory (26)
Kenneth J. Heater (15)
Barbara Thompson Isaf (14)
Steven E. Lawson (14)
David G. Leason (6)
Lawrence D. Lenihan, Jr. (7)
Court V. Lorenzini (10)
Robert P. Maliff (20)
Jeffrey P. McCrea (10)
Gregory A. Murray II (7)
Lowell Nelson (20)
Roger W. Nightingale (30)
John A. Ragunas (3)
Hollace S. Rhodes (18)
Michael G. Rhodes (16)
Peter A. Rich (5)
Andrew K. Rist (2)
William L. Rollins (9)
Iyad S. Saidi (4)
Robert S. Shepard (4)
Jonathn Skinner (2)
Craig R. Stiffler (10)
Deniz Teoman (1)
Martin C. Trively (9)
John-Kelly C. Warren (13)
Thomas J. Weck (4)
Denise A. Williams (13)
Lisa M. Willis (26)
Richard A. Wortman (11)
Kyle W. Young (3)
Joseph S. Zaren (1)

Class of 1988
56 Donors/ 173 Class Roll
32% Participation
Gregory J. Alcorn (21)
Gerard W. Appert (26)
Catherine C. Betor (8)
Christopher D. Caldwell (21)
Jackie T. Chan (12)
William J. Donnelly (3)
Christopher J. English (30)
Erik T. Eppers (9)
Kristen A. Fisher (15)
Randall J. Fuller (16)
Carlton H. Gerber (8)
Richard S. Goldenson (29)
Judith S. Gordon (10)
Michael A. Harman (16)
Richard F. Herbst (18)
Jennifer S. Hill (19)
Richard K. Hill (19)
Gregory O. Hjelmstad (7)
Ruby G. Holder (3)
Jeffrey W. Hughes (13)
Amede W. Hungerford (3)
Salim F. Idriss (4)
Gregory A. Janicik (15)
Meredith S. Josephs (17)
Conrad V. Langenhagen (1)
Sarah E. Levin (30)
David E. Levine (1)
Eric T. Lind (4)
Thomas S. Lindsay (20)
James R. Lowry (3)
Thomas C. Mazzucco (3)
Joan S. McAuliffe (1)
Steven P. Monti (27)
Michael Munley (20)
Tracy A. Nickelsburg (27)
Leslie S. Prescott (1)
Randy Redmon (18)
Bartt H. Richards (23)
Paul F. Ridgway (26)
Charles M. Roebuck, III (28)
William C. Ruotola (15)
Joseph A. Saldutti, Jr. (19)
Lee J. Tiedrich (10)
Manlio Valdes (5)
Kenneth R. Velleman (1)
Steven L. Walker (1)
William S. Westermann (1)
Eric F. Winakur (23)
Charles W. Wyble, Jr. (3)
Jeffrey M. Yoh (1)

Class of 1989
51 Donors/ 173 Class Roll
29% Participation
Troy G. Arnold III (13)
Jeffrey G. Bassett (21)
Steven B. Baumberger (8)
Thomas M. Betor (8)
Kevin J. Bozic (6)
Tricia E. Brentjens (4)
Mary C. Carlson (9)
Nixon P. Childs (2)
Lisa A. Coyne (2)
Susan G. Daniel (7)
Babita L. Deitrich (21)
Christopher L. Eisenbies (8)
George Fox, Jr. (23)
Dwight Galbi (19)
Mark A. Guffey (5)
Giraldo J. Gutierrez (1)
Tina M. Gutierrez (1)
Kyung I. Han (1)
Beth F. Hanson (23)
Steven R. Harman (9)
Timothy A. Harrison (2)
Alexandra P. Henriquez (2)
William F. Herbert, Jr. (22)
Laura L. P. Hluck (25)
Christine L. Hunter (4)
David A. Igel (8)
Stephen J. Jones (1)
James D. Kolenski (7)
Thomas W. Lattin, Jr. (10)
Suzanne K. Lehman (1)
Deborah D. Leland (7)
Benjamin T. Madden (4)
Mia K. Nadasky (22)
Stephen M. Nickelsburg (26)
Kathryn R. Nightingale (30)
David M. O'Brien (4)
Richard J. Pattinson (30)
Joseph A. Paydarfar (3)
Krista B. Ridgway (26)
Jennifer K. Robinson (29)
Vijay M. Shah (26)
Donald P. Shatto (5)
Scott E. Stephenson (1)
Scott E. Telesz (30)
Stephen G. Tell (24)
Elizabeth C. Tyler-Kabara (1)
Sheila K. Van Nederveen (16)
Robert R. Wahl, Jr. (18)
John L. Willis (26)

Class of 1990
85 Donors/ 261 Class Roll
33% Participation
John D. Adkins II (6)
Jamal Ahmad (19)
Eric W. Anderson (20)
Lisa A. Bader (6)
Alan H. Baydush (13)
William E. Beasley, Jr. (3)
Susan B. Beauchamp (10)
Torsten Berger (11)
Katherine Y. Bielefeld (22)
Matthew R. Bielefeld (19)
Anne M. Brack (2)
Cheryl S. Brashears (1)
Thomas K. Callaway (26)
John D. Case (1)
William P. Cerreta (6)
Michael G. Cetta (25)
Peter J. Chomyn III (4)
Gregory J. Clary (18)
John C. Crespo (1)
John A. Dickson (2)
Michael P. Dierks (28)
Jeffrey D. Dinkel (15)
Shannon L. Dreyfuss (1)
Christopher G. Duffy (7)
Kenneth J. Dunleavy (17)
Bruce L. Faulkner (8)
Cynthia A. Fink (6)
Robert R. Flenniken (1)
Christopher V. Forinash (24)
Elizabeth K. Forinash (24)
Amy B. Fowler (1)
Rick Gayle (8)
John J. Glushik (16)
Shawn J. Goodier (22)
William A. Gutknecht (17)
D. Gregory Hartman (1)
Michael J. Heffernan (1)
Paul T. Hertlein (24)
Michael A. Hughes (9)
Chris Johnson (20)
Douglas E. Johnson (5)
Brian A. Jones (1)
Andrew K. Jones (6)
Elizabeth S. Joslin (25)
Lance M. Kaplan (10)
Mary M. Kile (21)
Douglas C. Kley (14)
William Konomos (1)
Linda L. Kordziel (4)
Anthony C. Leung (5)
David P. Matarazzo (8)
Thomas E. McMullen (14)
Keir P. Meisner (1)
Brian E. Miller (6)
Michael A. Miniati (3)
Brenda Y. Mirabile (22)
Alfred W. Mordecai (28)
Robert A. Naslund (3)
Richard E. Nicholas (30)
Brian E. Nicholson (1)
Robert A. Oliver (9)
Robert H. Owens (1)
Douglas B. Pfaff (24)
Brian A. Porras (3)
Timothy L. Proulx (22)
Henry C. Purdy (1)
Robert L. Seelig (26)
Brenda C. Shepherd (12)
Anthony J. Sikorski (1)
Jerome C. Smith (5)
Brian P. Somerday (27)
Paul A. Steffens (2)
Samuel J. Stevenson (3)
Richard A. Strand (1)
Daniel F. Strauch (2)
W. Mark Strickland (6)
Hans-Peter Tandon (12)
Cheryl D. Vecchio (10)
William F. Walker (6)
Jeffrey L. Warhaftig (6)
Robert D. Wescott (16)
James G. Whayne (1)
Cheryl A. F. White (30)
Brian R. Williams (4)
John C. Wroton (30)

Class of 1991
52 Donors/ 175 Class Roll
30% Participation
Rob Aung (20)
Peter F. Biro (7)
Sandra H. Bonat (3)
Andrew A. Butler (2)
James L. Chittenden (8)
T. Glenn Coleman (13)
Thomas A. Corpus (25)
Jonathan L. Danielson (25)
Jeffrey S. Davis (1)
Richard L. Feliciano (19)
Eric J. Felt (15)
Eric M. Free (7)
Alan D. Friedman (2)
Stacy S. Gardner (29)
Timothy A. Gosnell (20)
Jon R. Hibschman (22)
Robert Ari Hirschfeld (22)
Josefina S. Hobbs (12)
Winston W. Huh (1)
Stacey W. Johnson (1)
David C. Kaelber (7)
William G. Karpovich (13)
Daniel R. King (1)
Eric W. Koehler (9)
Benjamin H. Le Blanc (21)
Michael D. Lee (3)
Steven H. Lin (16)
Tanya Shoenfel Nizialek (22)
Erin M. O'Brien (4)
Michael S. O'Leary (27)
John D. Pazienza (22)
Joseph C. Peterson, Jr. (10)
Denise I. Pittaro (3)
Aurora D. Pryor (3)
Timothy J. Rade (26)
Scott C. Raney (5)
Thomas C. Robey (14)
Paul L. Rodriguez (2)
Barry S. Safier (21)
Erich S. Schreiber (3)
Craig A. Straley (7)
Meredith C. Upchurch (8)
William D. Webster (19)
Kenneth S. Weinberg (19)
Dixie T. Wells (28)

Class of 1992
65 Donors/ 209 Class Roll
31% Participation
Kristy B. Arbogast (1)
Michael S. Bertisch (8)
Mahesh C. Bhumralkar (21)
William H. Blackmon (2)
Scott D. Booth (2)
Clifford S. Burns (1)
Christopher A. Casper (2)
N. Abraham Cohn (21)
Richard G. Collins (4)
Jeffrey M. Constantine (5)
Gregory W. Council (5)
Timothy R. Davis (1)
Harry W. Durgin, Jr. (2)
Greg A. Erens (16)
Susan M. Eugenis (28)
Tricia G. Gilbert (24)
Maisha T. Gilyard (1)
John E. Grupp (3)
Karen M. Guido (28)
Michael L. Guido (28)
Brett M. Hampson (1)
David B. Hanes (25)
Douglas A. Hardy (23)
Julie M. Hasenwinkel (3)
Lisa M. Hibschman (22)
Jaime D. Hobbeheydar (10)
Delilah J. Huelsing (1)
Christopher K. Hunt (6)
Kristen B. Kardovich (1)
James C. Lacefield (21)
James V. Lawler (2)
Kemper E. Lewis (22)
Erik Lorscheider (14)
Jarvis T. Lowndes (14)
Valecia D. Maclin (4)
Mark E. Mason (10)
Andrew W. McCown (7)
David W. McNabola (6)
Jeffrey S. McVeigh (8)
Justin B. Mead (1)
Terry J. Myerson (2)
Julia J. Nakhleh (27)
Ivan P. Parra (1)
James L. Pratt (27)
Anish D. Rajparia (11)
Andrew R. Reising (1)
Christopher J. Roy (2)
John A. Sartor (8)
William T. Schlough (13)
Peter V. Schroeder (9)
Andrew P. Seamons (1)
Judd W. Staples (15)
Robert J. Stets, Jr. (28)
Bradley A. Stewart (17)
Matthew C. Strauss (28)
Matthew D. Wade (27)
Joshua L. Wein (1)
Mark B. Williams (11)
Scott E. Williams (6)
David J. Witzel (14)
J. Dawson Wolfe, Jr. (1)
Darren E. Zinner (1)

Class of 1993
61 Donors/ 204 Class Roll
30% Participation
T. Richard Alfonsi (1)
Filip Banovac (8)
Sridevi V. Basavaraju (11)
Barbara H. Bodenstein (3)
Jeffery D. Burkland (1)
Adam W. Cates (27)
Julie H. Cochran (21)
Sean M. Connell (1)
B. Cason Coplin (27)
Michael L. Davitt (9)
David A. Deal, Jr. (4)
Rahul V. Deshmukh (3)
Thomas S. Eppinger (27)
Holly M. Espy (27)
Louis A. Falvo III (27)
Amy K. N. Fazio (2)
Nicole S. Finger (3)
James F. Fox II (21)
Michael R. Gustafson II (12)
Jeffrey A. Hancock (23)
Jill M. Hudkins (11)
Alva S. Huffman III (3)
Stephen S. Huh (22)
Hoi T. Huynh (4)
Alphonso Johnson, Jr. (1)
George W. Jordan (1)
Karl W. Kottke (10)
Michael L. Krachon (3)
Gregory P. Lissy (19)
Rickard C. Loftman (7)
Jeffrey K. Lopez (10)
Daniel H. Loughlin (1)
Brian E. Mackay (12)
Spiro J. Maroulis (6)
Jay Moller (11)
Erik N. Oberg (27)
Stirling E. Olson (19)
Graham A. Orriss (14)
Jennifer K. Orriss (14)
Debra M. Parisi (22)
Hong S. Park (10)
Gillian F. Parton (8)
Neeraja B. Peterson (8)
Brian A. Pietrewicz (8)
W. Stephen Poole (11)
Richard T. Rhee (22)
Michael K. Ryan (12)
Joseph E. Schafstall (22)
William J. Scheessele (3)
Ershela L. Sims (16)
David J. Sullivan (11)
Samir M. Tamer (3)
Jon R. Tervo (26)
Jeffrey J. Tsai (1)
Sheila C. Tsai (13)
Tracy B. Verhoeven (21)
David T. Wei (18)
Stephen D. Williams (1)
Jason N. Workman (27)
Robert A. Wyatt (9)
Brain K. Yamanouchi (27)

Class of 1994
69 Donors/ 265 Class Roll
26% Participation
Stephen C. Abate (23)
Matthew J. Anderson (5)
Anthony J. Bellezza (16)
Michael J. Bingle (22)
Fay W. Chang (1)
Roger K. Chang (1)
Gary W. Chung (1)
Brian S. Clise (17)
Russell B. Copeland (26)
Eric C. Correll (11)
Taylor M. Davenport (21)
Elizabeth A. Debartolo (26)
Michael J. Donnelly (22)
Rebecca B. Drabenstott (3)
Richard S. Dreger, Jr. (13)
J. Christopher Dries (2)
Jason L. Ekedahl (26)
Geoffrey R. Erickson (2)
Dennis M. Feenaghty (17)
Cecelia A. Gassner (3)
James A. Grover (24)
Susan H. Guswa (21)
Halim Habiby (17)
Eric K. Hall (1)
Dennis J. Hanzlik (18)
Mack N. Haynes, Jr. (1)
Brian L. Helm (11)
Kevin M. Hilton (2)
Steven C. House (17)
Warren H. James (11)
Pamela D. Jobert (9)
Chad R. Johnson (23)
David J. Krauss (5)
Mark E. Kraynak (12)
Wilson Y. Lee (13)
Joseph A. Levitin (22)
Audra P. Loftman (7)
David C. Lott (3)
Maria A. Manning (9)
M. Jonathan Mathers (12)
Deanna H. Matthews (1)
Elizabeth G. Mazhari (15)
Antonio Minchella (5)
Howard Nelson (1)
Heidi R. Pellerano (2)
Malcolm W. Peverley, Jr. (18)
Julia V. Phillips (26)
Michael T Prewett (24)
Michael L. A. Reams (22)
Andrea R. Roddy (21)
Christopher R. Salter (11)
Robert G. Santos (18)
Danielle W. Shelley (2)
Mark V. Slominski (11)
James R. Sokolowski (20)
Carter R. Stowell (2)
Christopher J. Thacker (5)
Andrew T. Vedder (11)
Romita L. Wallen (5)
Alan L. Whitehurst (21)
Jonathan M. Williams (20)
Christopher D. Wilson (25)
Rachel L. Winokur (1)
Class of 1995
52 Donors/ 183 Class Roll
28% Participation
Matthew J. Alinger (24)
Lisa L. Anderson-Hall (8)
Thomas H. Ayala (14)
Robert R. Bailey (25)
Jennifer T. Bhojwani (21)
Clifford J. Billings (25)
Jeffrey E. Bischoff (11)
David N. Buza (3)
Michael S. Caines (18)
Jeffrey A. Chard (22)
Charles D. Choi (24)
Allison B. Cleveland (18)
Monica D. DelCampo (4)
Mark S. Donnithorne (5)
Scott W. Dubbeling (25)
Nikolas C. Endrud (3)
Elizabeth J. Gaske (18)
David J. Genova (2)
Heather A. B. Harries (25)
Scott E. Harrington (5)
Laura V. Hawkins (2)
Elizabeth L. Hitchcock (3)
Mohammed B. Ismael (1)
Michael J. Jurgens (17)
Benli Kao (22)
Andrew V. Kayes (17)
Kevin G. Klinedinst (14)
Eric M. Manoff (4)
Steven A. McClelland (23)
Robert A. McClung (17)
Joel R. K. Moody (22)
Thanh Nguyen (9)
Naomi A. Oak (25)
Gregory D. Parker (14)
Brian T. Racilla (13)
Marshall A. Robers (20)
J. Judge Robinette (2)
Vineet K. Sarin (20)
Betts S. Slingluff III (11)
Neil K. Stafford (5)
Rodney J. Stanley (3)
Erin C. Sutcliffe (1)
Christopher D. Tapia (15)
Robert A. Vincent (4)
Stephen M. Waite (12)
Robert J. Waldner (9)
H. Davis Ward (2)
James C. Woodring (10)
Fair L. Yeager (2)

Class of 1996
66 Donors/ 204 Class Roll
32% Participation
Swati Agarwal (14)
Alexander G. Agrios (1)
Sherry M. Altman (4)
Imron T. Aly (22)
Andrew J. Armstrong (9)
Joseph T. Bailey (3)
Gary J. Barnhart (24)
Ethan I. Berger (24)
Thomas M. Brundage (24)
Frank Bruni (24)
Peter E. Bryan (3)
Brian K. Campbell (5)
James D. Campbell, III (22)
Andrew B. Carver (24)
Chui-Shan L. Chila (10)
Brian J. Chung (24)
Daniel V. Covello, Jr. (2)
Angelo B. Cruz (24)
Leslie L. Dickey (3)
Laura B. Feeley (18)
Sunil N. Gandhi (21)
Geoff K. Gavin (24)
Brett W. Goudie (1)
Kathleen M. Greaney (4)
Robert J. Haley (24)
Lorie D. Helms (6)
James K. Henry, Jr. (3)
Keren Hilger (8)
Benjamin M. Holzman (11)
Catherine N. Hounfodji (15)
Daniel V. Ingram (1)
Holly C. Kelly (9)
Andrew H. LaVoy (9)
Jeffrey D. Lewis (24)
Jeffrey M. Milheizler (24)
David B. Morton (9)
Roberto C. Munoz (24)
Suneel N. Nagda (13)
Drew G. Narayan (4)
Michael T. Nowak (6)
Allison C. Pajunas (6)
Clement D. Pappas (16)
Estela J. Patron (22)
Daniel J. Paul (3)
Alexander W. Rice (10)
Christopher T. Sabatino (22)
Derek K. Schubert (1)
Kevin R. Schwall (21)
Amy M. Scott (2)
Scott M. Shimp (24)
Joshua B. Skudlarick (18)
Shunmugavelu D. Sokka (2)
Daniel J. Sorin (21)
Michael D. Swinson (2)
Shannon O. Thornton (14)
Maura G. Tira (2)
James S. Walsh (8)
Daniel P. Weinstein (3)
Elizabeth C. Wong (8)
Eric K. Wong (8)
Ho-Pu Wu (1)
Kathleen M. Young (1)

Annual Fund

Class of 1997
59 Donors/ 207 Class Roll
29% Participation

Frank A. Badalamenti (1)
L. Ross Baker, Jr. (16)
A. Warren Brackin IV (5)
Peter C. Carlone (23)
Natasha D. Case (9)
Sandra M. Cavazos (3)
Y. B. Alan Chang (3)
Jim Chartier (9)
John D. Choi (5)
Amy E. Croot (23)
Stacey J. Davis (1)
Jeffrey W. Donnithorne (1)
Lee Anne Duval (8)
Francisco J. Fernandez (9)
James T. Fishburn (1)
Robert P. Flowers (23)
Sara H. Furber (7)
Daniel A. Godrick (20)
Varish Goyal (11)
Amara L. Hildebrand (10)
Blair T. Holt (1)
Elaine Y. Hsieh (11)
Harris H. Hwang (18)
Mara E. Kingsley (10)
Robert C. Kunz (11)
Morgan B. LaRue (17)
Melanie J. Licis (17)
Michelle A. Lytle (1)
Mi-Mi L. McCloskey (23)
Theron L. Metz (23)
Jeffrey K. Mills (19)
Maureen L. Mulcahy (8)
Gregory J. A. Murad (12)
Sangki Oak (8)
Abigail L. Pachon (3)
Rebecca L. S. Peterson (23)
Jason B. Piche (14)
Bryan S. Rheem (10)
Heather Y. Rodin (19)
Martina B. Roediger (4)
Bret A. Rogers (23)
Susan A. Rolls (7)
Charles W. Saletta (23)
Ananya Sarkar (1)
Malay B. Shah (5)
Todd A. Spears (23)
Dierdre V. Strigenz (3)
Anita M. Suchdeo (14)
Marwan K. S. Tabbara (30)
Linda M. Thomas (18)
Patrick C. Thomasma (12)
Lanette Y. Tyler (11)
Matthew J. Walker (6)
Michael A. Wesley (23)
Christopher H. Young (18)
Jennifer G. Zawacki (12)

Class of 1998
54 Donors/ 217 Class Roll
25% Participation

Lena F. Balucan (5)
Paul G. Bamert (20)
Theodore G. Barnes (1)
Ali Behbahani (1)
Kevin E. Bonebrake (2)
Aimee V. Chappelow (3)
Rajeev K. Chopra (10)
Jesse S. Claypoole IV (5)
Jennifer E. Coker (4)
George J. D'Ambrosio, Jr. (6)
Jeffrey C. Demenkow (4)
Damian V. Dolland (5)
Steven J. Drechsler (20)
Alexander H. Feng (15)
Amanda H. Gelber (19)
Nicholas R. Gelber (20)
Joseph L. Giacobbe (3)
Adam M. Giannone (14)
Russell M. Glass (5)
Russell S. Groves (19)
Deborah C. Hartman (15)
Faraz Hussain (12)
Ram M. Jagannath (6)
David M. Jordan (22)
Robert K. Judge (17)
Katherine L. Karazim-Walker (9)
Teresa C. Kelley (11)
Brian A. Kilpela (11)
Lawrence P. Lai (22)
Annette Y. N. Lam (5)
Marc R. Larochelle (8)
Timothy P. Lessek (2)
Ross Mayo, Jr. (14)
Patrick M. McLaughlin (17)
Gerald S. Meyer (20)
Eliza S. Nevers (3)
Sean O'Connor (12)
Yung H. Park (22)
Audrey E. Penrose (9)
Jennifer J. Peters (14)
Bradley A. Phelps (15)
Scott A. Skorupa (1)
Neil N. Snyder, IV (22)
Cheryl E. Starcher (21)
Frederic T. Tenney (14)
Travis M. Troyer (21)
Jonathan B. Tyler (11)
Robert B. Vermillion (1)
Virginia H. Yang (1)

Class of 1999
60 Donors/186 Class Roll
32% Participation

Brigitte M. C. Addimando (12)
Timothy E. Allen (21)
Joshua P. Arwood (11)
Neil S. Berlin (18)
Sarah S. Bernstein (18)
Brian R. Bleus (17)
Tynesia S. Boyea-Robinson (2)
Jennifer Brownlie (16)
Chadwick L. Campbell (7)
Margaret P. Chiou (11)
Young J. Choi (3)
John C. Cocker (3)
Michael R. Contarino (4)
Anthony T. Debenedet (9)
David E. Dolby (4)
Kelly B. Dyar (5)
Megan T. Elfers (20)
Jonathan A. Feifs (7)
Philip M. Garber (6)
Kevin P. Golart (4)
Andrew W. Gonce (1)
Amy M. Goodman (3)
Kathleen R. Grishman (13)
Ethan A. Hill (1)
Vladislav Ivanov (14)
Jesse N. Krohmer (2)
Anthony Lagnese (21)
Jeannie Young Lee (21)
Mark C. Lim (7)
Keri E. Lorincz (13)
Matthew H. Lunn (1)
Wesley R. McClelland (5)
Kevin B. McGowan (21)
Mark S. McKeag (9)
Ann N. Mittelstadt (19)
Riley W. Murdock (5)
Nilesh J. Murthy (1)
Christopher Nygren (3)
Laurel B. Passantino (16)
William L. Portnoy, Jr. (8)
Sasapin G. Prakalapakon (4)
Francis D. Preuss (2)
Mia K. Rahn (2)
Walter K. Robinson (2)
William T. Seddon (3)
Dipak P. Shah (6)
Jason T. Shibata (7)
Suneeta S. Sohoni (7)
Jordan P. Steinberg (18)
Jason D. Stipanov (6)
Delaney S. Stoval (1)
Sarah C. Townsley (21)
Brian A. Turner (9)
Daniel L. Wang (3)
Eric Z. Wang (13)
James G. Warriner (12)
Steven E. Williams (2)

Class of 2000
60 Donors/210 Class Roll
29% Participation

Miles D. Alexander (1)
Grant R. Allen (7)
Maria Barton (2)
Todd E. Behrens (9)
Carla W. Benigni (20)
Herbert F. Bohnet IV (14)
William N. Camp II (20)
Kevin Cheung (9)
Li C. Cheung (9)
Matthew A. Cornwell (20)
Tate L. Crumbley (19)
Sean E. Delehanty (3)
E. Keith Donnelly (11)
Kevin M. Eckhardt (3)
Mehmet E. Ergin (20)
Christian Essiger (4)
Eugene C. Farng (1)
Michael S. Ferrell (3)
Brian C. Fox (8)
John H. D. Gyurko (4)
Geoff W. Habicht (4)
Manish M. Hebbar (9)
Michael Hernandez-Soria (20)
Jeffrey M. Hindman (19)
Laura Huang (14)
Jonathan E. Hughes (2)
Brian D. Jones (6)
Michael G. Kamas (20)
Arnaud P. Karsenti (5)
Samuel R. Kuo (13)
Jon P. Lam (3)
George C. LaVerde (16)
Nana H. Little (4)
Daniel C. Lowrie (18)
Jason L. O'Meara (12)
Stacy L. Pineles (16)
Isai Ramirez, Jr. (6)
Jeremy B. Ratz (18)
Jacquelyn J. Renton (11)
Nathan S. Samras (7)
Adam R. Schimel (6)
Kenneth G. Schopfer (5)
Albert J. Schuette, Jr. (9)
Cary K. Shiao (4)
Daniel R. Silver (20)
Rebecca A. Simmons (2)
Brian M. Stempel (18)
Adam G. Stewart (18)
Yushing E. Sun (8)
Chi-Tsai Tang (2)
Gabriel E. Tsuboyama (13)
Justin L. Van Buren (20)
Richard S. Vandermass (11)
Elizabeth A. Vickerman (14)
Peter A. Weld (7)
Lauren K. Wisniewski (21)
Kristin K. Wolfe (1)

Class of 2001
60 Donors/185 Class Roll
32% Participation

Ingrid L. Abendroth (19)
Brian C. Alonso (11)
Brian R. Appel (8)
Alexis L. Beatty (13)
Ashish A. Bhimani (10)
Christopher T. Blitz (18)
James A. Bryan (1)
Emmanuel Y. Chang (2)
Mark R. Contarino (1)
Stephanie S. Cook (7)
J. Nathan Day (1)
Melissa L. Desnoyers (2)
Lauren S. Dieterich (17)
W. Grant Dollens (1)
Kevin Edwards (3)
Emre K. Eler (1)
Andrew S. Exnicios (11)
Jessica L. Foley (19)
Ethan J. Fricklas (5)
Allison H. Gaskins (18)
Stephan R. Gaskins (17)
Alan M. Gust (2)
John F. Hack III (18)
Bryn D. Harder (17)
Gregory T. Hasbrouck (19)
Sarah B. Higgins (19)
Judith Jacobson (11)
Aydin A. Kadaster (15)
Kerry M. Kidwell (19)
Jin S. Kim (12)
Paul A. Klenk (19)
Jennifer Koh (16)
Rebecca M. Kohl-Gomez (3)
Linette Lee (1)
Charles S. Lin (4)
Lauren N. Louis (19)
David J. Marquard III (11)
Thomas M. Meese (4)
Daniel B. Neill (11)
Amit B. Patel (1)
Anthony M. Pettes (6)
Clayton D. Poppe (17)
Brent J. Reid (4)
Sophia T. Santillan (19)
Nicole S. Schwartz (19)
Nicholas W. Sehn (2)
Harsha Setty (2)
Amy C. Sharma (19)
Navin Sharma (18)
Theodore C. Shih (1)
Lauren S. Stienes (18)
Brandon H. Stroy (3)
Tobias O. True (3)
Michael E. Weissinger (11)
Christopher A. Winter (8)
Amol R. Yajnik (15)
Kent T. Young (17)

Class of 2002
45 Donors/174 Class Roll
26% Participation

Benjamin J. Aitken (8)
Nader H. Al Ansari (10)
Benjamin D. Atkins (15)
Jesse L. Atkinson (18)
Benjamin S. Borns (11)
Cody Brownell (9)
Adam P. Burns (4)
Danielle Chalson (5)
Chien-Chung Chen (3)
John F. Cheng (16)
Sitaramesh Emani (6)
John A. T. Fath (13)
Julie K. Furt (18)
Tan Gao (2)
Christopher M. Grocki (13)
Jaclyn E. Hanifen (18)
Benjamin M. Harrison (9)
William L. Hill (1)
Ara A. Karamanian (5)
Susan J. Kaziny (1)
Dorlan J. Kimbrough (5)
David H. Lake (10)
Kristina L. Lundberg (2)
Christina M. Luquire (15)
Patrick B. Luquire (15)
John Means (18)
Andrew J. Meyers (9)
Steven R. Meyers (18)
Ryan J. Miller (14)
Deepa Mishra (1)
Sarah A. Park (17)
Mark S. Rockwood (1)
James A. Romes (11)
Maulin V. Shah (12)
Laney S. Stoddard (17)
Stephen T. Thompson (15)
Hung-Wei Tsai (1)
Stacey E. Varsani (2)
Alfred Wong (3)
Gabriel K. Yuen (2)
Enrico A. Zappi (2)
Rami D. Zheman (18)

Class of 2003
42 Donors/167 Class Roll
25% Participation

Annie E. Adams (3)
Joseph G. Baltz (17)
Ian D. Berman (3)
Craig R. Brown (1)
Darin H. Buxbaum (17)
Stephanie C. Chan (9)
Ka Y. Chau (14)
Max D. Cohen (17)
David S. Dipietro (14)
Thomas L. Earp (2)
Martin A. Elisco (17)
Charles P. Gelatt (15)
Anthony R. Geonnotti III (4)
Alexander L. Hooper (6)
Karen C. Hwang (10)
Derek K. Juang (5)
Huikai Karol (12)
Robert T. Kazmierski (17)
Jed J. Kim (3)
Mark D. Krasniewski (17)
Gopind N. Kumar (10)
Benjamin J. Lebow (1)
Christine T. Lin (15)
David H. Logan (11)
Matthew J. Mailloux (17)
David R. Maloney (3)
Margaret F. Mandell (12)
Andy T. Ng (18)
Jake Palmer (2)
Vadim S. Polikov (17)
Christopher A. Ross (3)
Elizabeth R. Strautin (17)
Amar K. Tanna (17)
Zachary D. Walton (1)
ShiBin M. Wang (2)
Gregory M. Williams (17)
Fran L. Wu (17)
Mark W. Younger (7)

Class of 2004
54 Donors/224 Class Roll
24% Participation

Jamie M. Alders (7)
John D. Alexander (16)
Steven J. Barmach (3)
Jonathan J. Bittner (2)
Christopher M. Boston (9)
Jason E. Chatterjee (14)
Meredith M. Cheng (10)
Kengyeh K. Chu (15)
Hyun O. Chung (12)
Paul D. Colavita (2)
Patrick R. Colsher (8)
Teresa T. Crowe (15)
Nicholas G. Csikesz (2)
James M. Dayton (7)
Jose D. De Ojeda (1)
Christopher J. Dillenbeck (16)
Allison M. Douglas (15)
Jonathan D. Drillings (14)
Joseph T. Elliott (10)
Colleen N. Farrell (5)
Matthew P. Farrell (5)
Eric J. Gardner (11)
Jeffrey R. Garro (5)
Brett A. Hainline (5)
Bradley H. Hledik (15)
D. Brandon Jones (16)
Jeffrey R. Jones (13)
Beum K. Kim (11)
Trent J. Kososki (1)
Jason B. Laderman (16)
Seth E. Lankford (2)
Paul A. Lisi (1)
Patrick C. Mathias (12)
Vito F. Mecca (16)
Alice H. Meyer (16)
Shadia A. Oshodi (2)
Michael R. Parsons (14)
Rizwan A. Parvez (15)
Victoria K. Pugsley (2)
Matthew R. Raubach (10)
Georgia A. Richter (13)
Christopher J. Sample (16)
Sumit A. Shah (6)
William A. Simpson (2)
Andrew D. Steinberg (5)
Russell Swagart (4)
Jennifer L. Thompson (9)
Richard P. Thomsen III (4)
Jeremy M. Tucker (5)
Andrew R. Tupper (3)
Brent T. Warner (2)
Kristine K. Warner (2)
Stephen T. Wu (13)
Sai S. C. Yagnyamurthy (2)

Class of 2005
69 Donors/ 253 Class Roll
27% Participation

Pasquale Arcese IV (15)
Noel Bakhtian (15)
Deborah A. Breisblatt (1)
Jeffrey D. Burlin (15)
Avery C. Capone (1)
Jonathan R. Carter (14)
Dennis S. Casey (13)
Laura M. Castaing (1)
Rajeev Chaudhry (2)
Michael G. Curcio (15)
Pierre J. deBoisblanc (8)
Julius K. Degesys (15)
Brian O. Diekman (2)
Jonathan A. Donahue (1)
Andrew F. Dreher (15)
Matthew M. Engelhard (1)
Thomas J. Fernandez (10)
James V. Finchum (12)
Jacob J. Flomenberg (6)
Andrew D. Galanopoulos (7)
Haven R. Garber (15)
Emma H. Giamartino (1)
Darwin Goei (8)
Thomas C. Goltermann (1)
Steven A. Gore (1)
Michael Guadano (4)
Charles T. Hagan IV (14)
Adam P. Hall (3)
James D. Heaney (14)
Stacey Hero (13)
Brian R. Hirsh (15)
Tushar S. Kirtane (14)
Jia-Wei K. Ko (6)
Emily M. Kovalchick (15)
Richard M. Larrey, Jr. (13)
Anthony G. Lau (9)
Kyle A. McCarter (2)
Jeffrey M. McCormick (8)
John R. McDowell IV (11)
Andrew Meyerson (1)
Douglas G. Mullen (9)
J. Ryan Nesbitt (1)
Shaun M. Noonan (15)
Yaw A. Nyame (1)
Lauren Opoliner (15)
Kevin S. Parker (15)
Nathan M. Partin (6)
Julianna S. Peacock (15)
Andrew D. Portnoy (15)
Michele E Pugh (15)
Sarah C. Ruffner (2)
Justin M. Shapiro (4)
Evan R. Shaw (2)
Nathan S. Sherrard (13)
Charles B. Soileau (9)
Isaac E. Specter (12)
Daniel Stepner (3)
Jason S. Su (9)
Joseph P. Tadduni (13)
Andrew L. Walls (3)
Megann V. Watters (2)
Adam L. Weinberger (15)
Sheena E. Wiesner (1)
Jennifer L. Wilbur (15)
Jonathan M. Zile (4)
Michael D. Zordan (9)

Class of 2006
72 Donors/ 226 Class Roll
32% Participation

Todd E. Aetherwyn (3)
Christine N. Armstrong (10)
Terry M. Arnold II (12)
Gareth T. Barendse (10)
Nasir H. Bhanpuri (2)
Brooke R. Bors (7)
Jeffrey D. Boyer (1)
Omaira C. Brightman (14)
Joseph M. Bruni (2)
Katherine E. Bulgrin (14)
J. Chris Champion (1)
Rachel W. Champion (1)
Zubair H. Chao (8)
Elizabeth V. Chong (1)
Margaret M. Civetti (1)
Patrick T. Cleary (7)
Mark H. Connell (10)
Michael D. Cote (12)
David R. Crowe (14)
Robert R. Demason (11)
Roger M. Diebold (13)
Eric W. Dooley (3)
Joshua M. Dubnow (2)
John T. Erickson (4)
Stephen C. Felkins (14)
Steven W. Gangstead (14)
Ryan S. Habbley (14)
Matthew W. Hawk (14)
Melissa Hawk (14)
Clare B. Hawthorne (14)
Le He (1)
Vy U. Hoang (13)
Michael A. Holliday (5)
Xinfeng Hu (6)
Daniel M. Kaplan (14)
Andrew S. Katz (6)
Clifton E. Kerr (8)
Daniel Kim (5)
Emily Y. Kos (14)
Dorothy Lowell (1)
Qahir Madhany (10)
Christopher R. Morecroft (2)
Laura B. Moss (5)
Emily M. Mugler (14)
Shelby A. Neal (14)
Devin C. Odom (10)
Courtney L. Olmsted (14)
Branon C. Painter (14)
Daniel S. Pergola (2)
Jialing K. Png (4)
Brent G. Powers (13)
Mahir H. Rabbi (2)
Anna L. Rack-Gomer (14)
Darren P. Rivas (5)
Daniel B. Rosenberg (1)
Johannah Sanchez-Adams (1)
Andrew R. Schmidt (14)
Erik P. Schmidt (1)
Roman G. Schwarz (10)
David A. Semko (2)
William B. Senner (14)
Andrew M. Stalnecker (3)
Peter L. Staver (3)
Kathryn F. Sullivan (14)
Mika J. Tanimoto-Story (14)
Kimberly W. Truesdale (3)
Gihan S. Wickramaratne (5)
Thomas A. J. Williams (3)
Randy M. Yamada (6)
Adam J. Zuckerman (12)

Class of 2007
70 Donors/ 197 Class Roll
36% Participation

Ronal G. Abraham (3)
Benjamin S. Abram (1)
Byron Alvarez (3)
Jonathan M. Arnstein (6)
Nicole L. Axelrod (13)
Aaron T. Baxter (11)
Charles A. Benzyk (1)
John B. Borofka (13)
Carlos D. Briseno III (7)
Lisa J. Burton (11)
James J. Bush, Jr. (2)

Annual Fund

Dennis J. Cattel (13)
Rachel L. Chaitt (4)
Stephanie J. Chen (3)
William L. Cooper III (11)
Elizabeth F. Courtney (9)
Conlin D. Crow (13)
Michael C. Dameron (5)
Gregory A. Darland (5)
John M. Dayton (2)
Nishanth K. Dev (13)
Frank M. Dreher (13)
Natalie C. Eagleburger (13)
David A. Fiedler (4)
Arthur C. Fischer-Zernin (10)
Amanda M. Fuller (12)
John P. Galanek (5)
Meng Gao (3)
Peter M. Gebhard (13)
Eric L. Geller (3)
Shaina M. Gram (7)
Kelly F. Greer (13)
Daron N. Gunn (2)
Cameron A. Harrison (1)
Richard C. Harting (13)
Jeffrey C. Herbert (13)
Meredith C. Herbert (12)
Justin D. Hilliard (6)
Derek L. Hsu (1)
David Huie (10)
Eric C. Hung (10)
Bibek Joshi (13)
John Kang (13)
Keigo Kawaji (6)
Turan A. Kayagil (13)
David P. Kelley (2)
Emily S. Kelley (2)
Jeffrey A. Kessler (2)
Tobias F. Kraus (13)
Brian J. Lewis (13)
Andrew J. Longenecker (13)
Adam G. Luchansky (1)
Claudia F. Mattison (1)
Kristin D. Morgan (11)
Lu Morrison (13)
Amy R. Motomura (13)
Chawkat B. Nammour (1)
Phillip D. Nicholson (7)
Ryan C. Pertz (12)
Casey J. Rubin (2)
Noah Sakimura (13)
John M. Schoenleber (8)
Eric M. Spitz (13)
Michael H. Stanley (13)
Jason Strasser (13)
Elizabeth A. Vasievich (13)
Aida M. Wiebke (11)
Rebecca E. Wilusz (1)
Lori Yu (7)
Xin Zheng (8)

Class of 2008
64 Donors/ 219 Class Roll
29% Participation
Robert C. Allen (3)
Nii A. Ampa-Sowa (12)
Timothy D. Antonelli (2)
Scott K. Bailey (10)
Dennis M. Bertlett (2)
Michael E. Bauer (11)
Matthew P. Burke (10)
Corey M. Butler (2)
Matthew F. Campbell (11)
Ian L. Cassidy (11)
Heidi Y. Chang (12)
Xiaoying S. Chen (2)
Dean S. Chiang (2)
Priscilla F. Chyn (12)
Stephen T. Clark (10)
John A. Crowell (8)
Q. Chelsea Curran (12)
Audrei E. Drummond (8)
Amauche Emenari (6)
Thomas J. Feehan (6)
Robert L. Fenequito (1)
Audrey J. Gaskins (10)
Philip J. Gorman (12)
Karli S. Griffeth (10)
William A. Hoffman IV (10)
Tiffany Hui (1)
Alexander Hwang (6)
Priscilla Hwang (2)
Jordan B. Iceton (9)
Ngozi L. Kanu (5)
Michael A. Keel (11)
Neha Krishnamohan (12)
Steven M. Lattanzio II (2)
Yong Liang (4)
Sebastian Liska (10)
Cristian C. Liu (12)
Justin C. Maxwell (6)
Leslie V. Means (12)
Arthur Mui (7)
Holly H. Ohlsson (12)
Eric J. Ojerholm (12)
Chinyere T. Okoli (12)
Christopher M. Parides (7)
John L. Perkins (8)
Drew G. Rindner (10)
Matthew T. Rinehart (3)
Jesse K. Sandberg (1)
Paul R. Scarborough, Jr. (4)
Michael T. Schaper (3)
Jeffrey D. Schwane (1)
Craig S. Silverman (9)
Geoffrey L. Southmayd (12)
Kyle W. Squillario (3)
John F. Sullivan (12)
Rick A. Szcodronski (10)
Megan K. Tooley (10)
Adam R. Udasin (11)
David M. Wagner (1)
Terence P. Wallace (12)
Andrew S. Waterman (12)
Yvonne J. Yamanaka (12)
Timothy D. Zepp (4)
Edison M. Zhang (10)

Class of 2009
89 Donors/ 274 Class Roll
32% Participation
Ersen Akici (4)
Peter W. Allen (3)
Laura M. Angle (11)
Kevin A. Autrey (3)
Alexander T. AuWerter (4)
John P. Barrett III (1)
Jessica B. Becker (11)
Alexander C. Berghorst (1)
Molly R. Bierman (11)
Kevin W. Brightly (2)
Seth P. Brown (10)
Aidan M. Burke (2)
Thomas A. Burkland (10)
Laura H. Chavez (8)
Christal P. Chow (1)
Katharyn Cordero (11)
Rafael A. Cordero (9)
Adam J. Dixon (11)
Caitlin T. Dowling (2)
Yuanlong Du (5)
Elana B. Edwards (12)
Arthur J. Everson (9)
Gregory E. Filpus (1)
Bryan E. Fleming (2)
Christopher G. Gibson (6)
Mikhail Gordin (7)
Alexander H. Gorham (11)
Benjamin D. Grant (10)
Shi Gu (2)
Xin Gu (2)
Thomas J. Hadzor (11)
Philip S. Harvey (9)
Antonia R. Helbling (11)
Andrew Hsiao (1)
Henry T. Jue (1)
Hyun-Joong Kim (1)
Whitney S. Kirchoff (7)
Daniel H. Klein (3)
Mary Ellen I. Koran (11)
David W. Kunz (10)
Daniel D. Lee (10)
Alex S. Li (8)
Vincent Y. Ling (11)
Jenna E. Maloka (11)
Eric S. Mansfield (11)
Irem Mertol (10)
Nicholas M. Millar (1)
Daniel W. Mistarz (11)
David J. Mitteness (11)
Todd E. Monson (8)
James C. Montupet (4)
Justin N. Mullen (11)
Kathleen M. Murphy (11)
Mhoire L. Murphy (11)
Adam L. Nelson (4)
Andrew Ng (7)
Jonathan L. Odom (2)
Jun-Jeong Park (2)
Sahil P. Patel (11)
Daniel A. Phillips (11)
Preston S. Porter (10)
Feini Qu (5)
James V. Razick (11)
Bryan P. Reisch (8)
Paul M. Riherd (7)
Christopher R. Rowland (2)
Michael B. Russell (8)
Brian C. Schulte (1)
Preeyanka K. Shah (3)
Michael L. Silver (10)
Anne Sloan (11)
Todd H. Stamp (5)
Scott A. Steinberg (3)
Bryan D. Stem (6)
Di Sun (6)
Ibrahim K. Toukan (11)
Christopher M. Wade (10)
Yifan Wang (11)
Andrew W. Winslow (1)
Daniel C. Wolf (11)
Duo Xu (8)
Tianhe Zhang (8)

Class of 2010
65 Donors/ 245 Class Roll
27% Participation
Pongpitch Amatyakul (10)
John M. Burton, Jr. (10)
Christopher Y. Caughman (10)
Olivia C. Chang (10)
David Chen (7)
Eric Chow (1)
Xuan Ding (1)
Alex D. Edelsburg (9)
David A. Eitel (10)
Stephanie R. Everett (10)
Manuel P. Fanarjian (3)
Zachary M. Fernandez (4)
Stephanie K. Finch (10)
Andrew D. First (10)
Thomas C. Gallmeyer (6)
William R. Gamerota (10)
Kasey C. Geibel (1)
Douglas M. Giannantonio (10)
Jordan C. Goldstein (10)
Jing Guo (10)
Adrienne L. Hamrah (8)
Daniel F. Hanks (10)
Zachary M. Harvanek (9)
Douglas M. Helferich (10)
Katherine M. Henderson (10)
Elizabeth H. Hwang (8)
Scott M. Ings (6)
Stephanie M. Korszen (7)
Gustavo Lee (10)
George W. Lefelar (10)
Jordan A. Lewis (10)
Jack Li (10)
Xiao T. Li (10)
Victor C. Lieu (10)
Emily A. Liu (10)
Tim X. Liu (1)
David B. Lue (2)
Melissa M. Lue (1)
Ashley H. Lyerly (2)
Michael A. McArthur (7)
Matthew T. McKenna (9)
Carson C. Moore (3)
Gerard J. Moorman, Jr. (9)
Alexandra Nichols (10)
Emily Poplawski (10)
Ankit Prasad (10)
Jason D. Rehlaender (8)
Samuel J. Reiss (10)
Kalen J. Riley (10)
Karan Sabharwal (1)
Kevin C. Story (10)
Prashant K. Swaminathan (2)
Jason S. Taylor (8)
Michelle A. Torski (10)
Amy M. Wen (8)
Peter C. Williams (10)
Tianyi Wu (10)
Patrick P. Ye (10)

Class of 2011
64 Donors/ 262 Class Roll
24% Participation
Pamela G. Anderson (8)
Stephen R. Bardin (4)
Scott R. Basford (1)
Michael T. Bell (9)
Rachel L. Belzer (9)
Joav Birjiniuk (2)
Michael J. Black (6)
Adam W. Caccavale (9)
Haoyu Chen (9)
Kaiting Chen (2)
Shame Chikoro (3)
Brett B. Cook (9)
Hatti Cutcliffe (9)
Matthew T. Davis (8)
Hudson H. Duan (4)
Megan K. Finley (9)
Jeffrey L. Forte, Jr. (9)
Lyndsey M. Fyffe (9)
Ankur B. Gupta (7)
Andrew J. Harris (8)
Justin M. Haseltine (9)
Corinne E. Horn (3)
Robert W. Hyberg (9)
Sean L. Hyberg (7)
Brandon D. Jones (9)
Ga-Young Joung (9)
Samuel G. Klein (1)
Jeffrey S. Kreutter (9)
Calvin Lee (1)
Charles R. Levergood (9)
Ian Li (1)
Edward Liao (9)
James E. Love, IV (9)
Timothy J. McDowell (4)
Daniel J. Moss (9)
Maura H. Mulroy (5)
Samuel F. Pancoast IV (8)
Hannah Park (1)
Cameron E. Parrish (9)
Andrew T. Pettit (2)
Adam W. Pollak (6)
Mark W. Pratt (9)
Anita M. Raheja (9)
Joseph P. Repp (2)
John M. Reynolds (5)
Gregory F. Rivers (1)
Emma V. Rovit (9)
James L. Royce (2)
James M. Royston, Jr. (2)
Karthik I. Seetharam (1)
Laila Sharafi (8)
Eric N. L. Thorne (9)
Chen-Ling C. Tsai (9)
Anjali S. Vora (9)
Jeremy T. Walch (9)
Kelly A. Waldman (9)
Matthew M. Wander (9)
Xin Wen (7)
Scott A. Winkleman (7)
Blair B. Woolheater (2)
Samantha S. Young (1)

Class of 2012
82 Donors/ 269 Class Roll
33% Participation
Vidhan Agrawal (8)
Kimberly P. Andes (1)
John T. Anton (8)
Megan C. Arias (2)
Samuel J. H. Baek (2)
Laura L. Barnes (8)
Paola L. Baskin (4)
Christopher R. Bayliss (6)
Adam J. Bennett (8)
Annelise J. Blomberg (7)
Michael Chen (8)
Kathryn M. Chiarelli (2)
Elizabeth R. Cobb (8)
Robert P. Cochran, Jr. (1)
Robert M. Curtis (7)
Michael J. Deng (7)
Robert J. Dimaiolo (8)
Amy A. Douglass (8)
Caleb M. Duncanson (3)
Shun Fan (5)
Michael B. Fausone (4)
Rachel A. Fleming (8)
Cody N. Freeman (8)
Michael J. Fritz (6)
James C. Gabriel (8)
Hareesh Ganesan (1)
John A. Hodge II (3)
Logan M. Hoy (1)
James Hsieh (8)
Bradley R. Jacobs (1)
Ankit S. Jain (1)
Sang Hoon Kim (1)
Steven J. Kober (8)
Siddhartha Kosaraju (4)
Sarah O. Larson (2)
Jessica A. Lehigh (8)
Ming J. Li (8)
Tian Li (2)
Kevin M. Lieberman (3)
Jared M. Lippell (8)
Dianna D. Liu (8)
William G. Mackebee (8)
Dyuti Mahendru (2)
Benjamin Maimon (7)
Andrew G. Mang (8)
Margaret E. G. Milby (2)
Jennifer L. Molnar (7)
Zaki D. Moustafa (8)
James W. Mullally (8)
Michael D. Oberst (6)
Izundu C. Obi-Onuoha (8)
Mikael I. Owunna (1)
Han S. Park (4)
Jeffrey W. Peyser (4)
David C. Radford (8)
Jordan H. Rehlaender (8)
Michael R. Rhodes (8)
Andrew G. Rohm (8)
Sonja W. Sahlsten (1)
Steven L. Schlaseman (8)
Catherine R. Schulte (8)
Robyn N. Schwartzman (8)
Han-Yu Shen (7)
Lauren E. Shwisberg (8)
Alex B. Sloan (8)
Taylor J. Steindel (5)
Martin H. Steren (8)
Michael S. Sullivan (8)
Ross K. Taggart (8)
Anna C. Territo (8)
Joshua L. Thai (2)
Daniel P. Tweed-Kent (2)
Margaret V. Upshur (5)
David R. Vander Schaaf (7)
Jiaqi Yan (8)
Kevin S. Zhu (4)

Class of 2013
62 Donors/ 291 Class Roll
21% Participation
Johan Adami (1)
Supriya M. Balachander (7)
Matthew T. Brown (1)
Michael S. Cai (1)
Timothy A. Carlon (7)
Natalia R. Carvalho (6)
Frank K. Chang (2)
Sijie Chen (4)
Chris Dennis (7)
Kerri Devine (7)
Derek C. du Plessix (7)
Casey J. Dunn (4)
Gregory A. Evans (3)
Robin L. Farrell (7)
Lee A. Ferber (7)
Juan F. G. Granados (6)
Jake E. Greenstein (3)
Erinn M. P. Grigsby (1)
Alexander J. Groszewski (3)
Jeremy D. Hockman (2)
Donald V. Husa (7)
Kevin J. Jen (1)
Wei Q. Jiang (7)
Mark Kagika (6)
Ishan Kapoor (2)
Christine D. Kelsey (6)
Jeong H. Ko (3)
Caleb S. Kroloff (5)
Christine E. Larson (7)
Daniel D. Lasowski (3)
Carl E. Lawson (7)
Cheryl J. Lee (1)
Emmanuel G. Lim (1)
Jinchin Liu (3)
Justin T. C. Liu (4)
Alexander T. Mariakakis (7)
Mason H. Meier (7)
Ryan D. Millner (6)
Marietta J. Morris (2)
Brian G. Norton (7)
Amit Parekh (6)
Aimee R. Raleigh (1)
Howard C. Ray III (7)
Michele Reshef (7)
Gregory A. Robins (7)
William J. Scheideler (1)
Derek J. Schulte (2)
Laura E. Sciarrino (6)
Kevin T. Seybert (1)
Constandi J. Shami (2)
Seung Y. Shin (1)
James I. Silber (1)
Michael W. Simmonds (2)
Colette B. Soloff (7)
Evan Strother (7)
Bennie Su (7)
Gregg B. Thawley (2)
Joshua O. Usoro (7)
Cole R. Vertikoff (1)
Adam J. Williams (2)
Christopher Wong (1)
Steven K. Yarmoska (7)

Class of 2014
58 Donors/ 276 Class Roll
21% Participation
Claire C. Alligood (2)
Jade M. Brown (6)
Jeffrey S. Chen (2)
Lance O. S. Co Ting Keh (5)
Daniel Concha (3)
Lucy C. Dawson (6)
Hersh S. Desai (4)
Sean D. Dickey (6)
Derek M. Eidum (1)
George W. Fan (3)
Graham R. Friday (6)
Morganne J. Gagne (1)
Jayson Garmizo (5)
Mark A. Gockowski (6)
Javier A. Henriquez (5)
Jennifer E. Hewitt (6)
Mark A. Hoffman (6)
Albert Hu (5)
Danish R. Husain (5)
Erica N. Inmacolato (4)
Inka E. Johnson (1)
Immanuel D. Kerr-Brown (3)
Brady D. Klein (4)
Andrew S. Koff (2)
Katharine S. Krieger (6)
Michael B. Krone (2)
Nathan X. Li (1)
Victoria Li (2)
Darrin S. Lim (3)
Helio C. Liu (6)
Jaisal K. Mariwala (5)
Scott T. Martin (6)
Emily Mass (5)
Ellen F. Morgan (6)
Lauren Morrison (1)
Jackson B. Morton II (6)
Michael J. Mosser (6)
Matthew E. Nagle (6)
Lucy Potts (5)
Amber W. Ragain (6)
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74 Donors/ 290 Class Roll
26% Participation
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Class of 2016
50 Donors/ 278 Class Roll
18% Participation

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Qian Wang (4)
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Class of 2017
69 Donors/ 311 Class Roll
22% Participation

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20% Participation

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49 Donors/ 303 Class Roll
16% Participation

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Kelleher, Andrew (1)
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Liang, Kendall (1)
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65% Participation

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