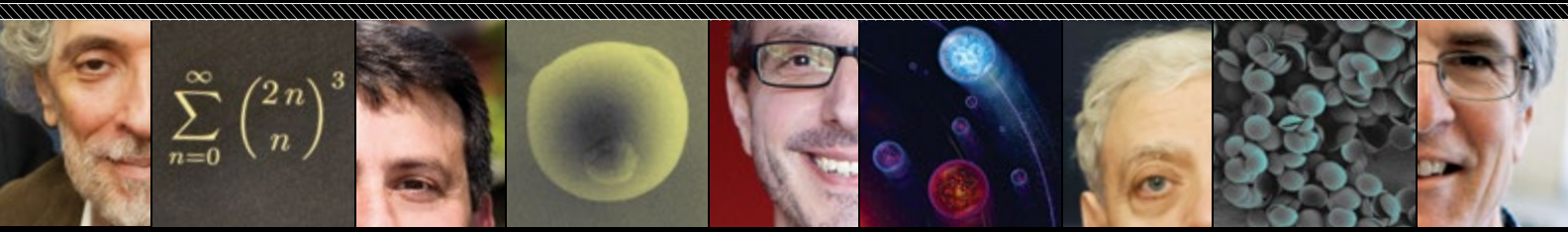
cable

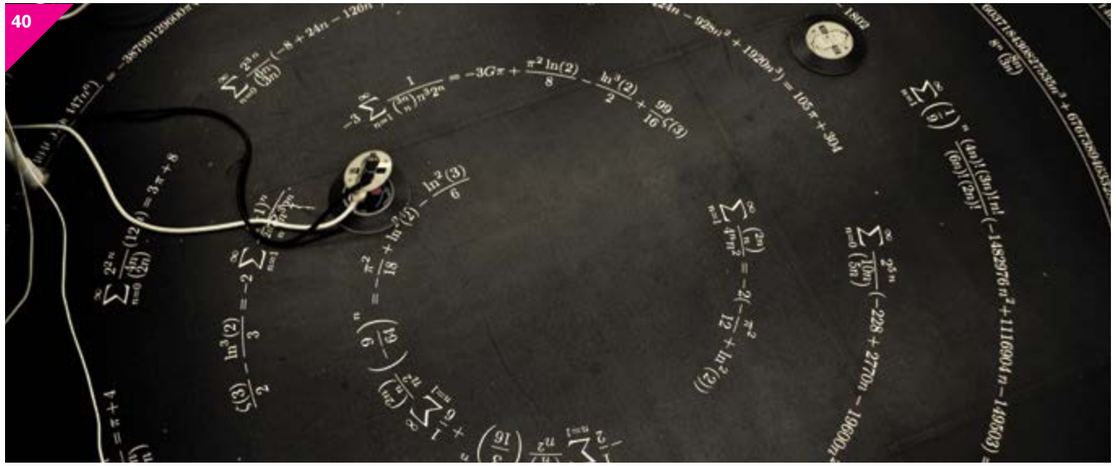
The Alumni Magazine of the NYU Polytechnic School of Engineering
Spring 2014 Vol. 41 No. 1

ENGINEERING AT WORK

The future of 5G, gaming, and more



NYU | POLYTECHNIC SCHOOL OF ENGINEERING



On the Cover:
Whether they are defining the future of wireless communication, designing video games, or engineering colloids, the faculty of the School of Engineering is always hard at work. Read more in the Spring issue.

On the Web:
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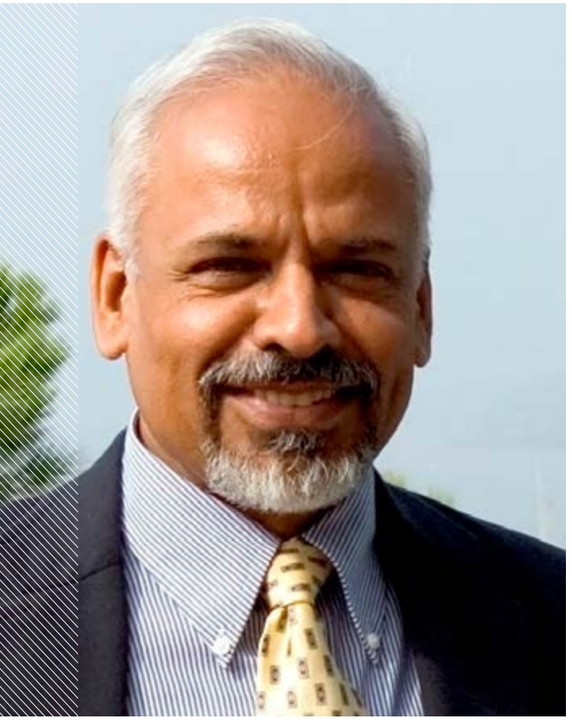

Dear Alumni and Friends,

This has been a banner year for our school.

We graduated some 1,800 outstanding students (B.S., M.S. and Ph.D.). They are the first to graduate under the NYU banner; for NYU, this is the first batch of engineering graduates since 1973. Although the NYU merger has led to an impressive array of possibilities for our students and professors—including new cross-disciplinary research opportunities and increased chances to study abroad—we have had many independent reasons for excitement and pride over the last several months.

The MetroTech Commons welcomed MAGNET in the first part of 2014. The event seals a multi-school collaboration between faculty from across the university and the NYU School of Engineering, and is the evidence that Downtown Brooklyn is becoming one of the nation's epicenters for game study and design. We are equally proud of our newest incubator, the Urban Future Lab, whose tenant companies are working towards a cleaner, more sustainable future, and our recently opened Institute for Engineered Interfaces.

The MetroTech Center has also been the site of multiple seminars and conferences, many of which have drawn industry experts and academicians from all over the world. In May, for example, the first-ever Brooklyn 5G Summit, organized in part by the NYU WIRELESS Research Center and Professor Ted Rappaport, was held here to explore the future of 5G wireless technology. That same month, mathematicians and math aficionados gathered for a conference organized by Distinguished Industry Professors David and Gregory Chudnovsky to celebrate the 500th anniversary of Albrecht Dürer's famed etching *Melancholia I*, which contains mathematical puzzles that still fascinate today.

Professors Ulman, Rappaport, and David and Gregory Chudnovsky, all of whom are featured later in this issue, are just a few of our many faculty members making an impact in their respective fields. It would take far more space than this to name them all and state their accomplishments. Indeed, simply listing the books and papers they have published, fellowships and grants they have won, and research they have completed would need several issues of *Cable*. I hope, therefore, that you will read and enjoy not only the volume you hold in your hands, but the subsequent ones that you receive.

I know you take pride in your alma mater, and we are working to ensure that you will always have reason for that pride. If you studied in the Department of Electrical and Computer Engineering, you'll be proud that Professor Elza Erkip is serving as a guest editor for the *IEEE Journal of Selected Areas in Communications* (JSAC), and I hope you look for her issue in autumn 2014. If you were in the Department of Computer Science and Engineering—or if you are simply a baseball fan—you'll be glad to hear that Professor Claudio Silva is devising a system of data analytics that will allow for complete and reliable measurement of every play on the field.

I concede that no letter like this or an alumni magazine like *Cable* will ever convey the scope and magnitude of everything going on here. I invite you to visit and see for yourselves. Your former teachers will be delighted to see you, as will I.

Until then, I wish you continued happiness, good health, and success.

Sincerely,

K. R. Sreenivasan

Katepalli Sreenivasan

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Katepalli R. Sreenivasan
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Dear Fellow Alumni,

It's a pleasure to be addressing you through the pages of a magazine devoted exclusively to you and your alma mater. The fact that you are reading *Cable* means that you're already interested and engaged in what's going on at the NYU Polytechnic School of Engineering, and I hope that you will find the articles contained in this issue an exciting look at all that's brewing here.

No matter what your current level of engagement, however, I'm calling on you to do even more.

Participate in our Giving Programs! The Promise Scholarship Fund, which has helped thousands of aspiring engineers since its inception, is just one opportunity. Keep in mind that the impact of your gift may be doubled by companies that match their employees' charitable donations. Consider joining the Duryea Society, which honors individuals who have named the School of Engineering as a beneficiary in their wills, trusts, retirement accounts, and life insurance policies—and check out page 8 to see a profile of John Wallace, a devoted member.

Whenever and wherever possible, recruit NYU Polytechnic School of Engineering students for full-time employment, internships, or co-op assignments. On page 10, you can read all about Mitch Shinbrot and the many NYU School of Engineering graduates he has hired at Electric Boat. I hope you'll be motivated to do the same at your own company. And even if there are no opportunities at your place of work, you can still serve as a mentor.

Allow your alma mater to help you move forward in your professional career by participating in our Executive Education Programs. Visit engineering.nyu.edu/epoly to find out more.

Please contact the Alumni Relations Office at (718) 260-3885 and alumni@poly.edu for other suggestions about how to become more involved—or to make your own suggestions. Valerie Cabral and her staff are always happy to hear from you.

Cable always provides a great chance to look back—on page 4 of this issue, for example, you can read about Yvonne Fleming, who played on the men's basketball team in those dark ages before there was any such thing as a women's team. It also provides an even greater chance to look ahead—read about all the developments that will soon be coming out of our new Institute for Engineered Interfaces on page 24.

But don't stop at just reading. Instead let *Cable* inspire you to act.

Warm Regards,

Gerald W. Dawes

Gerald W. Dawes
'84EE '89EE
PIAA President

COURTING SUCCESS

As a Pioneering Student Athlete, Yvonne Fleming Proved that She Could Play with the Big Boys

Yvonne Fleming works hard—and plays hard—in the Philippines (pictured here), where she serves as a director for international company Nowcom.

It comes as no surprise that Yvonne Fleming ('94EE) is super smart; everyone knows that graduates of the NYU Polytechnic School of Engineering are smart. While her intelligence ensured that she would excel in the classroom, it is her athletic prowess and grit that are still remembered here at the school two decades later.

Fleming had enrolled at the NYU School of Engineering (then known as Polytechnic University) following a 4-year stint in the military. Back then, when she wasn't jumping out of planes as an airborne paratrooper or fixing engines, transmissions, wiring, carburetors, generators, alternators, starters, and other items of that type as an Army mechanic, she could be found on the basketball court. An avid player, she had been a member of a gold-medal-winning team comprised of the 12 best female players in the entire U.S. Army.

She would play as a student too, she decided, but there was just one problem: at that time, the school lacked a women's basketball team. She was, however, undeterred. She explains, "Anytime something seems daunting or frustrating, I just think to myself, 'I've jumped out of planes. If I can do that, I can do anything.'"

Her only possible course of action seemed clear to her; Fleming approached Laddy Baldwin, the now-retired coach of the men's team, and asked to try out. "What choice did I have? I wanted to play, and I believed I was good enough to play," she says. "I'm very proud to have had the courage to step up like that and to have earned a place in the history of the NYU Polytechnic School of Engineering." Tommy Guerin, the current head coach of the team, concurs. "It took a lot of pluck and determination on her part to do that," he says. "She can consider herself a real trailblazer."

Fleming proved herself during the try-out and was accepted onto the team only to face another hurdle: earning the esteem of her fellow players. "Some of them played very aggressively," she recalls. "It was as though they were afraid that a girl might score against them, so they had to take extra pains not to let that happen. On the other end of the spectrum, there were some who were reluctant to even defend against me." Even though those players quickly learned that it was not smart to avoid defending her, she did not like the assumed lack of respect they had shown. "I wanted to be treated like any other player," she says.

As the season progressed, Fleming won the acceptance of her teammates and the admiration of spectators. It wasn't always easy—at times there was nowhere for her to change but a chilly bathroom stall, and she remembers a particularly demoralizing experience when she was forced to sit out a game because the opposing players were Orthodox Jews who refused to be on the court with a woman, lest there be physical contact between them.

Still, there were thrilling moments, and the team once even got to play in Madison Square Garden. "I have been playing since I was about eight years

FLYING COACH

Maureen Braziel Mentored Generations of Engineer-Athletes

When Maureen Braziel first came to the NYU Polytechnic School of Engineering in 1982, it was hard for the few sports teams on campus to attract enough players to compete. But Braziel, who ultimately worked for three decades here—19 of them in the top post of athletic director—tirelessly worked to increase the profile of the Fighting Blue Jays name, recruit student-athletes, and stress the importance of teamwork and sportsmanship to a population more likely to be found in the lab or library than on the playing field.

She found it unacceptable, upon her arrival, that there were no teams for the female students, and rather than simply bemoan that fact, she created a women's volleyball program, gradually adding basketball, softball, soccer, and other sports.

It was thanks in large part to her that the Jacobs Gymnasium was built in the early 2000s (although she has also insisted that credit be given to then-President David Chang and Dean of Student Affairs Ellen Hartigan as well) and that the School of Engineering was able to retain its status as a Division III institution when NCAA rules were made more stringent.

While Braziel, now retired, undoubtedly earned a spot in NYU history, she has an important place in the much broader history of sport as well. She is mentioned in books like *Making Her Mark: Firsts and Milestones in Women's Sports*, by Ernestine Miller, and the *Encyclopedia of Women and Sport in America*, by Carole A. Oglesby, for her pioneering accomplishments as the first woman ever to place in national judo competition—a 1971 feat that helped convince the American Athletic Union, which had always refused to sanction women's competitions, to finally relent.

By the time she came to the School of Engineering (where she naturally started both men's and women's judo teams), Braziel had been the undisputed heavyweight champion of the East Coast from 1967 to 1977 and compiled a record as a three-time Grand Champion of the U.S.

Few students recognized that there was a bona fide sports star in their midst, but Braziel, by all accounts, never seemed to care about fame or recognition. What she cared about was showing aspiring young engineers and scientists that they could find a sport they enjoyed, get out of the lab and into the gym, and enjoy some healthy competition.

old, and I still have the little trophy I won during a free-throw competition as a child," she recalls. "In all those years, playing at the Garden and winning that first trophy are the highlights."

She might not be the biggest star who's ever played at the Garden, but Fleming is still considered something of a celebrity at the School of Engineering. Maureen Braziel, the now-retired athletic director, remembers Fleming's grace and athleticism. "It wasn't only basketball," she recalls. "At the time I was coaching girls' volleyball, and she played on that team too. She really helped us out and improved our record." Braziel also remembers that Fleming's military training came in handy on occasion. "At the time, the athletic facilities were over in Farmingdale, a long bus ride away," she says. "Whenever we stopped, she made sure all the girls stayed organized and got back on the bus when they were supposed to."

Basketball is still a part of Fleming's life. When she is at her office in the Philippines, she plays on an all-male team at her company, Nowcom, and she never shies away from a pick-up game. "As long as I have a mean jump shot and a decent crossover I will play forever," she explains. ■

FEEL THE ENERGY

Last spring NYU Polytechnic School of Enginering alumni gathered at the Con Edison headquarters in Brooklyn, NY, for a day of networking, reconnecting, and celebrating their time at the school.

INTERACTING ON THE INTERCOASTAL

When Alumni in Southeastern Florida Get Together, They Make Waves

When they took a group of NYU Polytechnic School of Engineering alumni on a Delray Yacht Cruise sightseeing trip down the Intercoastal Waterway in February 2014, the crew on board the *Lady Atlantic* could not have been more professional or accommodating. The narration was informative and the weather was ideal. The cruise was followed by lunch at 50 Ocean, an elegant restaurant overlooking Delray Beach, where alumni and their guests enjoyed a tasty meal, skillfully prepared and artfully served. But while the group unquestionably appreciated the cruising and dining, its members had also convened for a more serious purpose: to discuss the state of STEM (Science, Technology, Engineering, and Math) education in Florida and to brainstorm about ways in which they could help.

Vikram Kapila, a professor of mechanical engineering who is deeply involved in the school's K-12 STEM initiatives, gave a presentation about the need for classroom volunteers and the teacher-training programs he adminstrators. This had alumni excited about the possibilities. Jay Bluestein ('66EE), who helped Mel Weinzimer ('67EE) plan the event, is now eager to help out in a classroom. He explained, "Given how many years of collective experience we, as a group, have in various STEM fields, there's no question that each of us can contribute a great deal in an educational setting. Everyone—from the smallest students up to those in high school—can benefit from having extra guidance and tutoring with STEM subjects." Mel Weinzimer, who has had extensive experience as a STEM volunteer since retiring in 2006, said, "Volunteering in a school setting is remarkably rewarding. Students need to have role models in order to maintain their interest in studying math and science. We need to have them want to pursue STEM careers"

Valerie Cabral, the director of the Office of Alumni Relations, points out that there could be an added benefit to such volunteer activity. "Just maybe," she says, "after being aided and mentored by our alumni, more students will envision themselves in STEM careers and will work hard to pursue the dream."

Another initiative that the School of Engineering alumni have agreed to pursue is to jointly plan future events and merge with the New York University Alumni club in Southern Florida. The University Alumni Club, which has been in place for 11 years, is a vibrant and active club and is eager to have engineering alumni join their organization.

An exclusive NYU Alumni Film Screening is the next event on their busy calendar. ■

Left to right: Director of Alumni Relations Valerie Cabral boarding the ship with Bluestein and Weinzimer

SPOTLIGHT ON JOHN WALLACE, DURYEA SOCIETY MEMBER

Not every eighth-grader would appreciate accompanying his mother on a trip to New York City to see a plain, old office at a college, but when John Wallace came to the NYU Polytechnic School of Engineering, then known as the Polytechnic Institute of Brooklyn,

the room in question had deep meaning for him. It had been dedicated in memory of his father, John, a chemical engineering major who had graduated in 1936. "So the trip was a special one," he explains. "And not only did I get to meet Donald Othmer [who then held the title Distinguished Professor of Chemical Engineering], but I got to eat at a Horn & Hardardt's automat for the first time."

"My father died when he was just 36 years old, and I was only four," Wallace recalls. "He had been a class president and valedictorian and was part of a group of incredible chemical engineers. His classmates included Carl Setterstrom, who became a vice president of Dart Chemical and Poly trustee; Ray Katzen, who invented some of the processes that created alcohol from plants, started a consulting firm in Havana, and dedicated the office in memory of my father; Henry Myers, who incidentally was the first to do the Butterfly Stroke in competition in 1933; and Joseph J. Jacobs, who built the huge engineering firm and was a great benefactor to Poly."

Following in his father's impressive footsteps, Wallace entered the School of Engineering in 1967. While he contemplated majoring in aeronautical engineering, the country's space program seemed to Wallace to be nearing its peak, and he decided instead on metallurgy. (The year of Wallace's admission, a new Department of Metallurgical Engineering, headed by Professor Alan A. Johnson, had been established.)

"The department was very small," Wallace recalls. "I think there were about seven students and seven professors, so it was almost like having private tutoring for years. It also meant we couldn't get away with a thing." Even though he was a student during what has been known as the "Swinging Sixties," Wallace acknowledges that the school's student body was particularly studious and serious. "I'm not saying that we didn't have good times," he explains. "But you came here to work and learn. I did take part in anti-Vietnam protests and enjoyed the social and cultural opportunities being in New York City presented, but my studies were the most important thing." He notes that on recent visits to the campus, the current students appear equally studious and competitive—a gratifying sight given the hard-partying reputation of many other colleges.

> "The group of chemical engineers who went to school here in the 1930s is certainly worthy of an entire book… That just might be a project for me in retirement."

Wallace not only studied hard—he worked hard. His summers were spent toiling in foundries, where the hardened blue-collar workers sometimes teased him for being a "college boy." Still, even though the work was difficult—casting ovens can easily reach 2900 degrees Fahrenheit—the jobs allowed him access to well-equipped research and development labs, where he was able to carry out his own investigations.

After graduating from the School of Engineering, Wallace went on to a wide and varied career. This includes stints at the American Can Company (then one of the largest such firms in the country), Texas Instruments, the silver manufacturer Handy & Harmon, and the precious-metals supplier Leach Garner. He is currently the president and COO of Deringer-Ney, which invents, develops, and supplies precious-metal alloys and precision components to the medical, electrical controls, and automotive industries, among others. He is active in the development of Micro Manufacturing, which uses raw materials and processes to produce stampings, plastic molded parts, and machined parts to 5-micron dimensions for the complex assemblies that are the future of medical devices.

He acknowledges that his education here paved the way for his career success. "I remember being advised as a student by a metallurgical executive at International Nickel to work for a company in the metals business that would allow me to build on my expertise by moving from engineering to production, sales, R&D—you name it—and that's what I've done," he says.

Because of his enduring connection to his alma mater, Wallace is a member of the Samuel B. Duryea Society, a select group of individuals who have named the School of Engineering as a beneficiary in their wills, trusts, retirement accounts, and life insurance policies and whose generosity allows a new generation of aspiring engineers to obtain a stellar education.

He may be even more of a fixture on campus one day. "The group of chemical engineers who went to school here in the 1930s is certainly worthy of an entire book. They made a major mark on the world," he says. "That just might be a project for me in retirement. I could start my research right at the Bern Dibner Library!" ■

John Wallace revisits his father's legacy and his own time at the NYU School of Engineering

GETTING A JOB THAT FLOATS YOUR BOAT

Mitchell Shinbrot Joined Electric Boat Right After Graduation, and He's Helping Other NYU Polytechnic School of Engineering Students Do the Same

Mitchell Shinbrot poses in front of some of Electric Boat's historic models. Shinbrot captained the company's recruiting teams comprised entirely of NYU School of Engineering alums.

Within minutes of walking into the Electric Boat Corporation, which had been established in 1899 to build the world's first practical submarine, the 54-foot-long *Holland*, Mitchell Shinbrot ('83BSME) knew he had found the place he wanted to work. The company's bustling shipyard, which he toured during the interview process, seemed like a wonderland to him, and when he was offered a job as an associate engineer, he eagerly accepted.

Although he had first earned a B.S. degree in physics from the State University of New York (SUNY), studying mechanical engineering at the NYU Polytechnic School of Engineering had been a natural progression for Shinbrot. Both his grandfather, Irving, and father, George, were mechanical engineers, and both were alumni of the School of Engineering. (Irving had graduated in 1920, and George, exactly three decades later.) That impressive lineage aside, Shinbrot had loved to dismantle and rebuild machinery since childhood; a trip to Disney World was, to him, a chance to try to understand the design intricacies of the rides and attractions, rather than be a passive spectator.

Shinbrot attended the School of Engineering during the years when undergraduate classes were held in Farmingdale, New York, and he frequently travelled to the Brooklyn location to take additional classes. His advisor, he recalls, was the late professor of mechanical and aerospace engineering Sebastian Nardo. "When you were in his office, you were his number-one priority," Shinbrot says. "I've tried to always behave in a similar way when I'm mentoring young engineers."

Shinbrot, now an engineering supervisor at Electric Boat, gets ample opportunity to mentor and guide others. Fittingly, he has recruited many graduates of his alma mater: about 100 graduates of the NYU Polytechnic School of Engineering are currently employed by the company. "Other supervisors have told me how happy they are with the quality of the engineers from the school," he says, "and they encourage me to continue recruiting them."

Shinbrot has captained the Electric Boat recruiting teams (comprised of all NYU School of Engineering alumni) that visit the School of Engineering during career fairs for 12 years and has served as the Electric Boat engineering directorate's hiring manager. It is particularly gratifying, he says, to tell attendees the benefits of working at the company he joined more than 30 years ago. "I bring a model of a sub along with me," he says, "and I explain how important our work is." He continues, "After all, each of our submarines carries 140 fine, young military members, and they are often going to locations where they are placed in harm's way. It's imperative that we very carefully design, build, and maintain vessels that will carry them back home safely."

Because of the classified nature of some of the work, Electric Boat can hire only U.S. citizens, and Shinbrot is particularly pleased when young applicants tell him they were recently naturalized and feel called to work for the national interest. "All of our employees take a great deal of pride in everything they do," he says. "Our engineers feel a sense of ownership, because they are involved in their products at every stage, from initial design to building to installation and maintenance. It's a wonderful way to work."

Even when students are not specifically interested in Electric Boat, Shinbrot encourages them to attend his sessions, during which he generously gives interviewing tips and conducts resume reviews. He considers it, in part, repayment for the kindness shown to him by the Electric Boat recruiter who had come to campus back in 1983. "I was very nervous and having a hard time getting through the interview, mainly because the light shining through the window was blinding me, and I was too embarrassed to mention it," he laughs. "The recruiter was perceptive though, and he sensitively adjusted the window shade so I could focus on the actual interview."

Although Electric Boat now employs some 12,000 people at its shipyard and engineering buildings in Connecticut and its automated hull-fabrication and outfitting facility in Rhode Island, it maintains a family feel. "It's really wonderful to be here on our open-house days, when our employees get to show their spouses and children where they work," Shinbrot says.

He's happy, he says in conclusion, that so many School of Engineering graduates are part of the Electric Boat family and hopes that there will be even more joining the clan soon. ■

A MULTI-BOROUGH BACK-TO-SCHOOL DAY

An Intimate Brunch in Brooklyn Followed by a Broadway Show Made It a Back-to-School Day to Remember

"About the only thing that still looks the same is the Brooklyn Bridge," Lawrence Lapson joked. He was just one of the many members of the Golden Jubilee class marveling at the changes undergone by the school—and Brooklyn itself—since they graduated in 1964.

Members of Lapson's class—along with fellow alumni from all decades—gathered on the last weekend in April to reminisce, hear an address from Dean Katepalli Sreenivasan, view a presentation on women in engineering, and see the hit Broadway show *Jersey Boys*. In one respect, that musical may have been an appropriate choice for the Class of '64, given that it features tunes that many of them remember fondly from their formative years. In another respect, however, this was not a crowd overly nostalgic for New Jersey—their hearts decidedly belonged to Brooklyn.

Howard Taub—who earned his bachelor's degree in 1964, as well as graduate degrees in '65 and '69 and was the recipient of the 2012 Distinguished Alumnus Award—was particularly gratified that the borough's tech sector is booming so spectacularly. "It was great to study at Poly five decades ago," he said, "and it's great to be back to see how the school and surrounding neighborhood have grown. The business incubator system here is really impressive, and it's a sign that the school is still focused on innovation, just as it's always been."

Following a champagne brunch, Dean Sreenivasan greeted the crowd and answered questions, many of them centered on the need for increased diversity in the fields of engineering and science and the real-world challenges that will need to be addressed by future generations of graduates. "We shine in several areas, including biotechnology, wireless, cybersecurity, and urban infrastructure," Sreenivasan asserted. "Our newer graduates will undoubtedly contribute greatly to society, just as you in this room have done."

Discussion turned to the changes being wrought by the official merger with NYU on January 1, 2014, and Sreenivasan told the audience that the resulting opportunities for collaborative research, expanded course offerings, and international study were proving exceptionally exciting to students and faculty alike. One member of the Class of '64, Nelson Ying, a nuclear physicist heavily involved in promoting STEM education through his philanthropy, teased, "I, for one, am excited by the name change. Do you think NYU stands for Nelson Ying University?" Turning serious, Ying, who fled with his parents from China during the Communist takeover in 1955, said, "This place, no matter what they call it, is responsible for helping me, as a young immigrant, become a success. I'm glad that it continues to do the same for successive generations of aspiring scientists and engineers." ■

Left to right: Alum Howard Taub '64 '65 '69; The group aboard an NYU trolley on their way to see *Jersey Boys*

WHAT'S IN YOUR WALLET?

In August 2014, the Answer Will Be a Brand-New NYU Alumni Card

You may have heard increasing buzz about the many benefits that come along with the School of Engineering joining the NYU family. Perhaps you have already been to the Torch Club, looked into a membership at an NYU gym, or purchased discounted tickets to a Broadway show through Ticket Central—benefits accessible only to NYU alumni donors when they make a gift of any size to the school.

In August 2014, NYU alumni benefits will be even better. That's when the new NYU Alumni Card, a wallet-sized ID card, will be distributed to all NYU alumni. Alumni will be able to use the card, which is powered by the PerksCard network, to redeem discounts at thousands of business locations around the globe. So, whether you are hoping to try a new restaurant, going to the movies, or looking for karate classes for your child, chances are that a merchant or service provider will offer discounts through the PerksCard network. (This represents a major change from the previous alumni card, which was available only to alumni donors and included primarily on-campus benefits.)

Amanda Putzer, the assistant director of NYU's Alumni Affinity Programs, is excited about this expansion of the NYU alumni benefits program. "We are always looking to give more to NYU alumni, and the new alumni card will allow us to do this," she says. "Coupling the PerksCard with the current campus-related benefits really provides an all-encompassing program for all NYU alumni." She added, "The program will also feature a downloadable app that alumni can use to locate participating businesses within a certain radius." ■

CALLING ON A CAREER COACH

Whether you're a recent graduate unsure of the best way to showcase your qualifications or a mid-career professional seeking to make the transition to a new job or field, you might find yourself in need of advice from time to time.

Luckily, as an alumni of the NYU Polytechnic School of Engineering, you have access to a terrific resource: the Wasserman Center for Career Development.

By appointment, you can speak with a career coach, have your resume reviewed, practice interviewing techniques, or take a workshop at the Center, and you can access job listings any time by registering at NYU CareerNet.

The Wasserman Center's Brooklyn-based office is located in the Jacobs Building at Six MetroTech Center, in Suite 359, and can be reached by calling 718-260-3650 or sending an email to career.development@nyu.edu.

"Engineering provides such a wealth of career possibilities," Paula Lee, a Wasserman Center director, says. "It's truly a world-changing field, and we're proud to be helping NYU's engineering graduates do their vital work. The NYU Wasserman Center also anticipates that engineering alumni will provide networking opportunities and support to the current students. This is priceless!"

As Lee mentions, in addition to all the other services it provides, the Wasserman Center also offers a chance for graduates to give back through its Professional Network. Connecting to aspiring young engineers by serving as a mentor or participating in panel discussions and networking events at the Center is a rewarding way to thank your alma mater for its role in your career success.

James Sillcox, who heads the Brooklyn office of the Center, summarizes: "We are excited to be able to expand NYU's career services and resources to School of Engineering alumni, who have always been very successful in their endeavors. We hope to build a strong network of experienced professionals who find value in our services and are also able to support current engineering and technology students through mentorship and professional networking opportunities."

THE NYU COMMUNITY FETES THE SCHOOL OF ENGINEERING IN BROOKLYN

Administration, Faculty, and Friends Were on Hand to Celebrate the Long-Awaited Merger at the Brooklyn Academy of Music

It isn't every day that elected officials, university presidents, community leaders, students, scientists, and dignitaries from both sides of the East River gather in one room to celebrate. But then again, it isn't every day that two acclaimed schools officially merge, as Polytechnic Institute and New York University did to form the NYU Polytechnic School of Engineering. Not only does the union represent one of the more significant milestones in NYU history, harkening back to 1898, when the School of Medicine consolidated with Bellevue Hospital Medical College, or 1925, when the New York College of Dentistry merged with the university to become NYU College of Dentistry; it brings the vital field of engineering back to NYU for the first time in four decades.

While the official merger took place on January 1, 2014, on January 30, a diverse and energized group gathered at the Brooklyn Academy of Music to be greeted by NYU Dean of Engineering Katepalli R. Sreenivasan, who announced, "Ladies and gentlemen, the merger is done." He thanked everyone who had played a part—"It took a lot of work from a lot of people," he acknowledged—and he heartily encouraged the audience to keep in mind that their attention must now turn to "the real tasks ahead," including making sure that the engineering school proves to be of service not only to the city but the world.

Former trustee John Kirksey and his wife, Helen, were among those expressing excitement over the merger and eagerness to help with those tasks. "This means that [the School of Engineering] will have a much larger stage to play on," Kirksey said. "And, of course, it fulfills NYU's needs for an engineering school. It's a great situation for faculty and students at both institutions, and it's going to be beneficial to the city as a whole."

Those sentiments were echoed throughout the festive event, which featured a backdrop emblazoned with the simple, yet very true, statement, "Two Strong Traditions. One Even Stronger Future." Charlie Hinkaty, a board member of the School of Engineering and NYU, praised the "tremendous opportunities the merger is presenting for all." Standing by a banner bearing an evocative logo—the NYU torch surrounded by swirling electrons—he asserted, "It's not just a great engineering school that NYU is getting; we'll be bringing the whole [School of Engineering] perspective to the university—that unique way that engineers look at the world and tackle its problems." Gerald Dawes, President of the Polytechnic Institute Alumni Association, added, "Our engineers will undoubtedly reap the benefits of being affiliated with a world-class research institution like NYU, and the world will benefit from our innovation and invention."

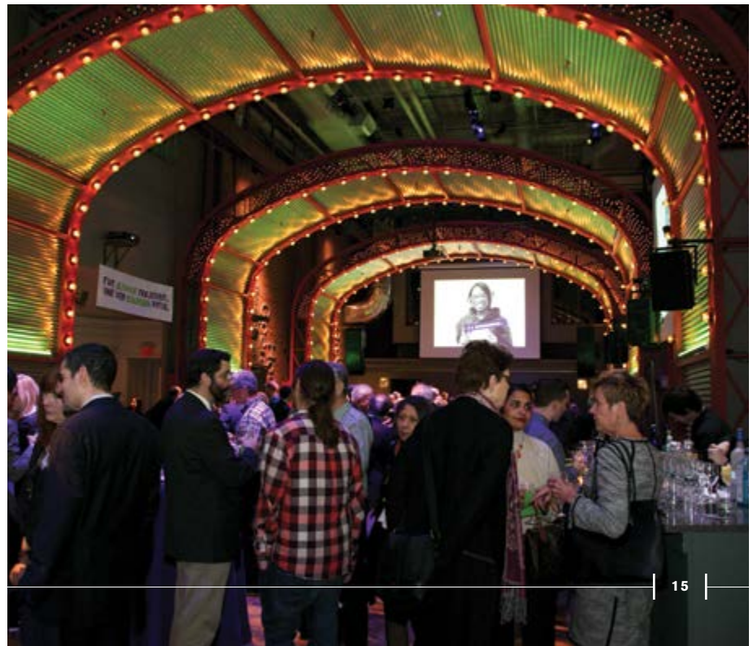
Speaking on behalf of Borough President Eric Adams, Deputy Borough President Diana Reyna marveled at the opportunities for Science, Technology, Engineering and Math (STEM) education that NYU Engineering would present for Brooklyn's young people, particularly in underrepresented groups such as minorities and girls. "NYU has been given a passport to the borough, so please use it," she exhorted. NYC Council Member Stephen Levin praised NYU President John Sexton and Former School of Engineering President Jerry Hultin for having the foresight to invest in the future of Brooklyn back when they first envisioned the merger. "Thanks to them, we are exactly where we need to be, and we're doing just what we need to be doing," he said. "And great things are going to be happening right here."

In a video prepared for the event, Sreenivasan, a renowned physicist, lit a small flame in a lab, comparing it to the School of Engineering. When he placed a tubular chimney—representing NYU—over the flame, the result was an impressively tall, burning vortex.

The video also included interviews with several students, professors, and staff members, who eagerly described the opportunities for cross-intuitional study and collaboration that the official merger is bringing—not to mention agreement that Brooklyn was in fact the most innovative borough in NYC. Their infectious enthusiasm—and Sreenivasan's demonstration—elicited laughs and cheers, but the crowd grew even more raucous when a student-developed robot was shown cutting a ribbon, symbolizing the official launch of the NYU Polytechnic School of Engineering.

NYU Provost David McLaughlin has no doubt that in years to come, the entire university community will have even more reason to gather and celebrate. "With this union between our two great institutions," he predicted, "we are melding two strong traditions to forge an even stronger future." ■

From left to right: NYU President John Sexton and the School of Engineering's President and Dean Katepalli Sreenivasan and Past President Jerry Hultin were among those celebrating the merger at the Brooklyn Academy of Music; Dean Sreenivasan speaks at the event; the crowd at BAM



READY AND RESILIENT

The New York State Resiliency Institute for Storms & Emergencies Is Helping Make Sure We Can Take Whatever Mother Nature Dishes Out

Everyone knows that New Yorkers are made of stern stuff, but Governor Andrew Cuomo knows that we need to be even stronger and more resilient. In the wake of Superstorm Sandy, which devastated the region in late 2012, killing some 50 New York State residents and causing more than $40 billion in damages, he called for the establishment of a new university-based think tank, charged with researching the challenges posed by extreme weather and natural disasters and disseminating their findings.

The New York State Resiliency Institute for Storms & Emergencies (NYS RISE), as it is called, is a partnership between the NYU Polytechnic School of Engineering and Stony Brook University, with input from Columbia University, Cornell University, City University of New York and the Brookhaven National Laboratory.

The School of Engineering's researchers, led by Professor Fletcher "Bud" Griffis, are conducting studies that will help government officials and agencies determine how best to help communities across the state recover and rebuild. "We've looked at bridge piers, for example," Griffis says. "Some were heavily damaged by the storm and in dire need of repair, but some merely required routine maintenance. It's important that needs be prioritized and resources used in a way that will do the most public good."

Aside from determining how the deal with damage already done, however, researchers are aiming to mitigate or prevent further damage in future emergencies. "There is a question of whether or not to allow residents to rebuild in flood zones," Griffis says by way of example. "And if you do allow it, what conditions should be set? Should new structures be elevated and how high?"

Many such questions can be answered only by taking an interdisciplinary approach, and in addition to its other NYS RISE partnerships, the School of Engineering has collaborated with faculty members from additional NYU schools, including Stern and Courant.

Among the core areas of concern for NYS RISE are the rapid warning system (which involves assessing evacuation plans, response capabilities, and long-term forecasting); the interdependence between infrastructure and the ecosystem—in other words how flooding impacts transportation, power, and drinking- and waste-water systems; climate change and the rise in sea level; and determining gaps in planning and specific vulnerabilities.

Elham Azimi and Samaneh Gholitabar, graduate students in construction engineering and management who work closely with Griffis, are particularly interested in addressing those vulnerabilities using risk analysis. "Every major construction problem involves risk," they explain. "There will always be safety risks, health risks, environmental risks, and economic risks. Assessing the risks upfront and planning for them is vital."

NYS RISE members have no interest in dwelling in an ivory tower—no matter how well fortified against a storm. They aim to make the path from research to application as short as possible. "We are marshalling all our resources to bring timely scientific data that will greatly inform recovery planning, improve the resilience of community assets, and protect against future storms," Griffis says. With some experts predicting that by the 2050s, 72 square miles—or almost a quarter of the city—will face the danger of flooding in a so-called 100-year storm (one that has a 1% chance of occurring in any given year), it is reassuring that NYS RISE is at work. ■

Professor Fletcher "Bud" Griffis, pictured here with grad students Elham Azimi and Samaneh Gholitabar, is helping New York State become a more resilient place.

AUGMENTED REALITY CAN BE AWE-INSPIRING

The NYU Polytechnic School of Engineering hosts the Augmented World Expo (AWE)

Given how few of them have been distributed, most people have never used or even seen Google Glass or any other wearable computing device. However, if you had walked into the first annual East Coast Augmented World Expo (AWE: NY) on March 25th, hosted by the NYU Polytechnic School of Engineering, Google Glass and countless other augmented reality devices would have been apparent.

The full-day conference focused on the future of augmented reality technology and the strategies being used to develop

them. Geared towards a broad audience, including users and developers, the conference included educational sessions and tutorials for developers and designers; live demonstrations by the leading smart glasses, "wearables," and augmented reality companies; and exhibits where attendees could experience augmented reality technology first hand.

Speakers were featured from augmented reality companies such as HIT Lab in New Zealand, Patched Reality, and Augmate, and primarily focused on the technology allowing the world to become more interactive and the people behind it. The talks were geared towards a varied audience, and by the time the excited attendees left, they knew what designing experiences in 2018 would look like.

The event was hosted by New York University's Mobile Augmented Reality Lab, part of its Integrated Digital Media program, and Mark Skwarek, professor of Integrated Digital Media at the NYU Polytechnic School of Engineering.

Skwarek was thrilled by the turnout, "The NYU Polytechnic School of Engineering was the ideal host for this event because of our focus on teaching and research—we had the resources to open the event to the public—to make the technology fun and understandable for users and simultaneously present the future of the technology for developers and researchers. What can I say? The future is here and it is changing quicker than ever."

The conference preceded a larger Augmented World Expo (AWE), now in its fifth year, that took place May 27-29 in Santa Clara, CA. ■

FULL SPEED AHEAD

Students at Brooklyn's St. George Residence Are Exceptionally Well Connected

On January 31, 2014, Educational Housing Services Inc, (EHS) and the New York University Polytechnic School of Engineering revealed an exclusive IT networking service for all New York University Polytechnic School of Engineering students who reside at the St. George Residence in Brooklyn Heights. With this unique service, students will maintain a direct IT network connection to the main building at 6 Metrotech Center, allowing them to enjoy the same network experience in their residence hall or at school.

Jeffrey Lynford, EHS CEO and President and NYU Trustee, launched the network during a ceremony with NYU Polytechnic School of Engineering President and Dean Dr. Katepalli R. Sreenivasan.

This access is exclusive to the rooms of NYU School of Engineering students living at EHS. Being a private, closed network, accessible to only NYU students and controlled by the NYU School of Engineering's IT department provides a safer environment for students using it.

"In a sense, we are bringing the student residents their campus, but without the commute. We are proud to be in a partnership with the NYU School of Engineering, and just as with any of our partner schools, we strive to find ways to satisfy their unique needs and enhance the experience of their students living at EHS," says Lynford.

Sreenivasan adds, "EHS listened to what our students needed and created a solution. EHS is truly distinct in its eagerness to go above and beyond for its partner schools, and I greatly appreciate its proactive approach in meeting the students' needs." ■

SPOTLIGHT ON NYU'S URBAN FUTURE LAB

The Future is Efficient, Resilient, and Smart

"You can't manage what you don't measure," Felix Lipov, the lead software engineer for Enertiv, says. His company, which is responsible for the eye-catching display hanging at the entrance to the Urban Future Lab (UFL), designs and manufactures meters and sensors that work with proprietary software to give a granular picture of a building's energy consumption from the circuit-box level—and to provide targeted recommendations about reducing waste—a vital service when by some estimates almost a third of the energy used in commercial buildings is squandered.

"If a tenant in an office building has all the lights on at 3 a.m., when no one is working, or if the air conditioning is on and it's 40 degrees out," Lipov explains, "that kind of wasteful behavior can be automatically addressed and corrected."

Based in a New York City borough, with thousands of high-rise structures as possible test beds, Enertiv has a distinct advantage in addition to an NYU affiliation. Besides providing a great pool of interns—School of Engineering senior Sarah Scott is currently working on hardware for the company—NYU is lending its own buildings to the Enertiv mission. "We are going to be installing units across Third North to monitor individual suites for all 950 students," Lipov says enthusiastically. "We think that students will be motivated to compete with those in other suites to change their behavior and reduce their energy consumption."

Tech companies around the world are hearing about the benefits conferred by being in Brooklyn, and the UFL's first international firm, Smarter Grid Solutions, made the move this year. The company had been founded in the United Kingdom to help utility distributors better manage their grids. "We have a strong position in our home market, where we work with five out of the U.K.'s six power distribution companies, and this success is now extending into mainland Europe. We knew that the next big market for our technology was North America," Colin Gault, one of Smarter Grid's principal consultants, says. "We read about work being done at the NYU Polytechnic School of Engineering by Professor Francisco De Leon and heard about the Urban Future Lab and its close relationships with the main players in New York's energy sector and knew that it would be a great base of operations." Like Enertiv, Smarter Grid Solutions has hired an intern from the NYU School of Engineering, Tianlin Liu, who is earning a master's degree in electrical engineering and enjoys working with her jovial and outgoing supervisors.

The company, whose headquarters are in Glasgow, recently won a contract to create technologies for ConEd that will help increase the resiliency of its electrical grid during emergencies and weather-related power outages—a particularly pressing concern in the wake of Superstorm Sandy. Their project, undertaken with the help of NYSERDA and the NYU Center for Urban Science and Progress, involves investigating how Distributed Energy Resources (DERs), like privately owned microgrids, could be integrated into the wider system, thereby creating better smart-grid and smart-city infrastructures in the future. Bob Currie, a co-founder of Smarter Grid Solutions and its chief technology officer, explains that NYU maintains a microgrid in Washington Square, and during Sandy, when the surrounding area was plunged into darkness, the lights in key university buildings continued to work thanks to the school's 13.4-megawatt combined heat and power plant, housed below Mercer Street. "The resilience of the power grid is of utmost importance, particularly during an Currie says. "And incorporating more microgrids and DERs is a solution that, with our technology, utilities can realize today." ■

INCUBATING THE FUTURE

"Could we discuss market capitalization?" "How have you addressed the obvious liability issues here?"

Those aren't questions you'd expect to hear from the average middle-schooler, but when kids from Avenues: The World School visited Brooklyn to tour the UFL, the queries were exceptionally insightful—and numerous.

"You're all asking better questions than I've heard at some investor meetings," David Mahfouda, the founder and CEO of the start-up Bandwagon, a service that facilitates real-time ride sharing, quipped to the students, who were all enrolled in an Avenues mini-course called "Plugging into the New York Start-Up Scene." Conceived of and taught by Mark Harrison, the course aims to immerse students into the city's start-up ecosystem and encourage the critical thinking required to understand what it takes to run a successful business. (Harrison is an enthusiastic and engaged teacher, but his main job is marketing the world's first human-powered translation platform, VerbalizeIt.)

Mahfouda was just one of the CEOs at the UFL who took the time to speak to the Avenues students and field their perceptive questions. Representatives from Radiator Labs, a company that converts old cast-iron radiators into precision heating machines, and HEVO Power, which makes wireless charging stations for electric vehicles, also dropped by the conference room to explain their goals and strategies to the excited young people.

Asked whether they could see themselves working to bring their own business ideas to life at an incubator one day, they broke out in a frenzy of nodding. It seems likely that in a few years the UFL will be drawing some of its new crop of tech entrepreneurs from among Harrison's students.

REACHING THE CrEST

Sakir Hossain Participates in a STEM Program as Both Student and Teacher

When he was attending Midwood High School, a massive Brooklyn institution whose enrollment hovers around 4,000, teachers were always happy to see Sakir Hossain—at least whenever they ran into technical difficulties with a piece of equipment or software. Long fascinated by computers and gadgets, he was part of the team of student workers deployed to troubleshoot when things went wrong, and it's easy to see why an English teacher hoping to share a presentation on medieval literature or modern poetry might breathe a sigh of relief to see Hossain when PowerPoint hits a glitch.

It's harder to see how Hossain, who emigrated to the U.S. from Bangladesh with his parents when he was an infant, found time to work: he was taking a heavy load of courses, some of them Advanced Placement, and tutoring other students on the side. Still, when a teacher told him about the chance to participate in a program called Creativity in Engineering, Science, and Technology (CrEST), developed by the Center for K12 STEM Education, he was intrigued.

CrEST, taught by students from the NYU School of Engineering, emphasizes hands-on, lab-based lessons related to circuitry, electronics, mechanical systems, physical computing, robotics and other STEM disciplines. "By the time I had completed the course, I was even able to fix my own motherboard," he says. He had also developed an intense interest in attending the School of Engineering himself, and he entered as a freshman in the fall of 2013. He is majoring in Mechanical Engineering. "When I saw the 2008 movie *Iron Man* [in which a wealthy industrialist played by Robert Downey Jr. builds himself a high-tech armored suit], I was inspired," he laughs.

Despite his course load, he remains involved with CrEST—this time as one of the teachers. The oldest son and the first in his immediate family to attend college, he is comfortable with the role of mentor. "Some of the kids I'm now working with are from Midwood," he says. "Maybe I'll inspire them to come to the School of Engineering too." ■

SUMMER'S HEATING UP WITH STEM

The School of Engineering Gears Up for its 2nd Summer of STEM

APPLYING THEMSELVES TO RESEARCH

The Applied Research Innovations in Science and Engineering (ARISE) program launched in summer 2013 (during the NYU Polytechnic School of Engineering's massive Summer of STEM initiative) and is looking forward to a second season in summer 2014.

The academically strong 10th and 11th grade students chosen to participate in ARISE, which is funded by the Pinkerton Foundation, come from schools in Brooklyn and other boroughs. During the rigorous seven-week program, they undertake college-level coursework; receive mentoring by a graduate or postdoctoral student; and work in one of several faculty labs, where they are introduced to engineering concepts and principles, the scientific method and ethics, and lab safety.

Students could find themselves in Dr. Magued Iskander's Soil Mechanics Lab, Dr. Masoud Ghandehari's Optical Sensing Lab, Dr. Nasir Memon's Information Systems & Internet Security (ISIS) Lab, Dr. Nikhil Gupta's Composite Materials and Mechanics Lab, or a host of others. Dr. Vikram Kapila, who hosts students in his Mechatronics Lab and also helps administer the Center's programs, says, "It's wonderful to realize that when we discuss the NYU School of Engineering's robust commitment to STEM education, we do not have just a professor or two engaged in these activities. Fully one-third of all our faculty members take part in K12 STEM education projects." He adds, "This year our Center is expanding even further, and there will be faculty from other NYU schools involved as well."

SAFE AND SECURE

With one of the oldest and most recognized cybersecurity programs in the country, it's only natural that the School of Engineering's STEM efforts include a strong cybersecurity element. With help from the National Science Foundation and the National Security Agency, in 2013 Brooklyn became the site of a series of highly successful cybersecurity camps, which are expected to be equally effective and engaging during the second Summer of STEM, in 2014.

Participating high-school teachers will have a chance to prepare a curriculum that will guide their students toward STEM mastery and participation in the largest student cybersecurity competition in the world—Cybersecurity Awareness Week (CSAW), hosted each year by the School of Engineering—and professors from other colleges and universities will conduct research alongside School of Engineering faculty members and learn how to ignite students' interest in cybersecurity careers.

Young women in high school will also have their own dedicated camp, an important component since they comprise a particularly underrepresented demographic: Although women fill close to half of all jobs in the U.S. economy, they hold less than 25 percent of STEM jobs and make up only 13 percent of the country's cybersecurity professionals, according to the report "Women in STEM: A Gender Gap to Innovation" by David Beede of the U.S. Department of Commerce and his colleagues.

Area students participate in CrEST, which emphasizes hands-on lessons related to STEM disciplines

A PROMISE MADE AT THE PIERRE

2014 Gala Honors National Grid Executive Officer, NACME President at Manhattan's Pierre Hotel this spring

The NYU Polytechnic School of Engineering honored two exemplary figures during a gala on April 29, 2014 in the Grand Ballroom of Manhattan's Pierre Hotel. The event recognized Steve Holliday, the chief executive officer of National Grid, who received the Leadership Award for his contributions to the field of engineering, and Dr. Irving Pressley McPhail, the president and CEO of the National Action Council for Minorities in Engineering (NACME), who was given the Vision Award for his pioneering efforts to help underrepresented minority men and women achieve their dreams of becoming engineers.

In addition to paying tribute to the pair, the gala benefitted the Promise Scholarship Fund, which has raised millions of dollars in the 26 years since its inception and has helped thousands of the brightest students from around the world to earn degrees at the school. Most Promise Scholars are from groups traditionally underrepresented in science, technology, engineering, and mathematics (STEM) education; many are the children of immigrants and the first in their families to attend college. All recipients, as the name of the fund implies, demonstrate extraordinary promise.

During the event—which was emceed by Carmen Wong Ulrich, host of NPR's *MarketplaceMoney* and an NYU industry professor of finance and risk engineering—McPhail informed the guests that the NACME Scholars program would be making a five-year grant of $300,000 to the Promise Fund, thus continuing the long and fruitful relationship between his organization and the School of Engineering. (Since 2004, NACME has supported the education of 235 students at the school.) Calling the School of Engineering "a very important partner institution," McPhail thanked the presenters for his award and said, "The significance of this recognition, during our 40th anniversary year, is an indicator of how NACME has contributed to the growth of the number of African Americans, American Indians, and Latinos in the STEM workforce."

Accepting his own award, Holliday, whose company has long been one of the school's most active and loyal supporters, addressed the necessity to educate more engineers of all ethnicities and genders. "We need to see a dramatic increase in the number of engineers," he asserted, "if we are to continue to grow the economy and address the global energy and environmental challenges of the 21st Century."

Holliday and McPhail join an impressive list of Promise Fund gala honorees. They have included Ursula Burns, CEO of Xerox; Glenn Britt, former CEO of Time Warner Cable; Arthur Martinez, former CEO of Sears, Roebuck & Co; and engineering innovator and philanthropist Paul Soros. ■

NYU School of Engineering Board Member Rudolph L. Wynter, Dean Sreenivasan, and honorees Steven Holliday and Dr. Irving Pressley McPhail at the 2014 Gala

FACULTY NOTES

Justin Cappos, an assistant professor in the Department of Computer Science and Engineering, and his students designed NetCheck, the first tool of its kind for diagnosing failures in complex networked applications like Skype, Firefox, and Apache. Upending traditional application diagnostics, NetCheck requires neither source code nor application-specific information, but instead relies on modeling and simulating networking behaviors to identify issues that cause failures.

Nikhil Gupta, an associate professor of Mechanical and Aerospace Engineering, has analyzed the "Brazuca" ball, which was specifically designed for the 2014 World Cup in Brazil. (Adidas has been designing new soccer balls for every World Cup since 1970.) The popular Live Science website has posted a video in which Gupta explains how the ball's innovative materials and design contribute to its more accurate and repeatable flight path, ability to regain its shape after being kicked, and resistance to even the harshest environmental conditions and he has appeared on several news shows as an expert during World Cup coverage.

Katherine Isbister, an associate professor of Computer Science and Engineering and director of the Game Innovation Lab, gave a presentation at IndieCade East, an international games conference and festival held in New York City in February. Along with the Lab's resident artist, **Kaho Abe**, she urged game developers and academics to embrace the connection between art and engineering and displayed wearable electronic-embedded costumes developed for use as gaming controllers.

Jin Kim Montclare, an associate professor of Chemical and Biomolecular Engineering, has been chosen as a 2014–15 Fellow of Drexel University's ELATE (Executive Leadership in Academic Technology and Engineering), a highly competitive professional-development program for academic women in the STEM fields. The year-long program is aimed at increasing personal and professional leadership skills and creating a cadre of exceptional women who will enhance their respective institutions and society. She will visit Drexel's Pennsylvania campus on a regular basis, participate in online classes and discussions, and help mount a research symposium as requirements of the fellowship.

The annual National Academies Keck Futures Initiative (NAKFI) brings together some of the nation's best researchers from academic, industrial, and government laboratories to explore and discover interdisciplinary connections in important areas of cutting-edge research, and this year, when the conference centers on collective behavior, Associate Professor **Oded Nov** of the Department of Technology Management and Innovation will be among them. Nov's work focuses on social computing and explores the social dynamics that shape technology-enabled collaborations. This marks the second time he has been chosen for the honor.

The National Academy of Engineering (NAE) chose **Maurizio Porfiri**, an associate professor in the Department of Mechanical and Aerospace Engineering, to join a select group of 60 of the most promising engineers under the age of 45 from Japan and the United States to participate in the 2014 Japan-American Frontiers of Engineering Symposium. Exploring how robots can be used in disaster response is one of the four cutting-edge research of the intensive symposium—particularly fitting for Porfiri, whose best-known research pursues the development of robotic fish that could lead living ones away from human-made dangers. In other news, Porfiri and his colleagues have overturned the traditional experimental paradigm for alcohol-related studies, in which all subjects are exposed and their behavior and movements analyzed. Instead, they devised an original method that would allow for detailed tracking of a single, alcohol-exposed zebrafish amid a school of "sober" peers. Their studies are helping to unravel the complex interplay between alcohol and social behavior and may lead to new therapies for mitigating the negative impacts of alcohol use and abuse.

Theodore "Ted" Rappaport, the head of NYU WIRELESS and the David Lee/Ernst Weber Professor of Electrical Engineering, gave the keynote address at the 2014 IEEE International Conference on Communications in Sydney, Australia. Rappaport's talk, "Defining the Wireless Future—Millimeter Wave Wireless Communications: The Renaissance of Computing and Communications," explored the remarkable expansion in capacity and services that future millimeter-wave communications will offer. The invitation to keynote at the multi-day conference was far from the first time that Rappaport had been honored by the IEEE. A longtime IEEE fellow, he counts among his more recent laurels the 2012 William E. Sayle Achievement Award from the IEEE Education Society.

Google has granted a Faculty Research Award to Professor **Torsten Suel** of the Department of Computer Science and Engineering to support his study of new index pruning and index tiering techniques that could significantly reduce hardware and energy costs for large web search engines. Google, which estimates that its index is now well over 100 million gigabytes, bestows the unrestricted grant upon scientists working in areas of key interest to the company as well as to the broader research community. This marks the third time Suel has received the award.

Each week the Social Science Research Network (SSRN) compiles a list of the five papers downloaded the most often over the preceding seven days. Given the sheer quantity and breadth of the papers posted on the site, it is a rare honor to land in the top five. During the week of May 16, however, professors in the Department of Finance and Risk Engineering took up not one, but two of the five spots. "On the Biases and Variability in the Estimation of Concentration Using Bracketed Quantile Contributions," co-written by **Nassim Taleb** and **Raphael Douady**, and "Profiting from Machine Learning in the NBA Draft," by **Philip Maymin**, were each downloaded almost 1,000 times.

INTERFACING IN BROOKLYN

The Borough's New Institute for Engineered Interfaces Is Becoming a Hub of Collaboration and Discovery

When the Institute for Engineered Interfaces (IEI) housed by the NYU Polytechnic School of Engineering, held its inaugural conference on January 31, 2014, it drew experts from several research areas in science, engineering, and medicine. They gathered to present and hear talks whose titles like "Revelations from Glycomic Technology" and "Bio-inspired Optofluidic Lasers" might hold some abstraction at first read.

Located on the eighth floor of Rogers Hall, the IEI includes a synthetic chemistry lab and a cell culture lab, among other features.

But the work being undertaken at the IEI has deep practical meaning, as the solution to almost any technological or medical problem lies in understanding and controlling interfacial structure and interactions.

The faculty of the Institute—drawn from schools and departments across NYU—are engaged in everything from the study of the fundamental properties of interfaces, which are ubiquitous in nature, to the development of new medical procedures and new materials with unique properties for applications in several fields.

At the IEI, collaboration is much more than a buzzword. Located in Brooklyn's Tech Triangle, the facility allows physicists, chemists, materials scientists, engineers, medical doctors, and others to study and work together on chosen projects. "It's imperative to be in the same room and interact, even as students," Avi Ulman, the Institute's founder, explains. "A mechanical engineer and a dentist might think they have nothing to speak about, for example, but if they get together and brainstorm, who knows what they will come up with?"

The answer to that question is, undeniably, plenty. Below are just a few of the Institute's researchers and what they are up to.

DANIEL MALAMUD

Professor of Basic Science and Craniofacial Biology at the New York University College of Dentistry

"You're probably accustomed to going to your doctor, having him draw some blood, and then waiting a few days for the results to come back from the lab," Dr. Daniel Malamud, a Professor of Basic Science and Craniofacial Biology at the New York University College of Dentistry, says. "But imagine that you're in a remote village in Africa, and the doctor has to travel for hours by Jeep to reach you to test you for AIDS, malaria, or tuberculosis. By the time he gets the results and returns to treat you, it might be too late."

Malamud works on what is known as Point-of-Care (POC) devices, self-contained tests that can give almost immediate results in non-laboratory settings. In addition to being exceptionally quick, the devices he is developing will be reasonably priced to purchase and use—less than a dollar in most cases. (For one test, he has been able to modify a simple penlight from Radio Shack, under which malarial DNA will fluoresce.)

A biochemist by training, Malamud acknowledges that engineers are vital to his work. "I can go to an AIDS conference, and every clinician there will have read the same journals and attended the same meetings," he explains. "So you need to mix it up. You only make strides by interacting with others, and engineers and clinicians working together have been responsible for some of the world's greatest medical advancements."

"WHEN RESEARCHERS FROM THE MEDICAL SCHOOL WORK WITH THOSE FROM THE ENGINEERING SCHOOL, THE RESULTS ARE NOTEWORTHY."

BRUCE CRONSTEIN

Professor of Medicine, Pathology, and Pharmacology at the NYU Langone Medical Center; Director of the Clinical and Translational Science Institute; and Chief of the Division of Translational Medicine

Doctors often explain that the goal of translational medicine is to take knowledge from "lab bench to bedside." That process is facilitated when interdisciplinary teams work together, Dr. Bruce Cronstein—a Professor of Medicine, Pathology, and Pharmacology at the NYU Langone Medical Center; Director of the Clinical and Translational Science Institute; and Chief of the Division of Translational Medicine—explains. "When researchers from the medical school work with those from the engineering school, the results are noteworthy," he says. "We see new drugs developed, new technologies for monitoring heart rates, and new ways to detect seizures, among other developments."

Cronstein himself is studying adenosine receptors, which could provide therapeutic targets for a vast array of medical problems, including sleep disorders, immune deficiencies, inflammatory conditions, and even cancer. "We're going to provide the targets that chemical engineers can aim for," he says.

He looks forward to many other researchers from the medical school participating in the IEI. "The more collaboration and communication, the better," he asserts.

LARA MAHAL

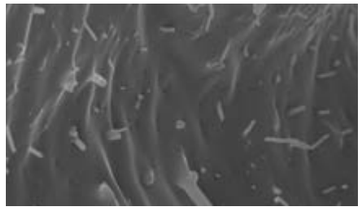
Associate Professor of Chemistry at NYU

NYU Associate Professor of Chemistry Lara Mahal's presentation at the IEI conference on January 31 was considered something of a tour de force by the fellow scientists in attendance, but she is equally adept at explaining her work to laypeople—mainly through the power of metaphor. "Think of each cell as being sugar-coated—just like an M&M," she says. "My work is to crack the code of what those sugars are telling us."

In Mahal's world, microRNAs can act as "decoder rings" and glycomes can serve as "canaries in a coal mine."

Later, she might switch to a different analogy, explaining that if you can change a cell's code, you can change the fundamental nature of how it interacts. "Think of it this way. When Cinderella was dressed in rags, she interacted with the people scullery maids normally interact with," Mahal quips. "But change her into a ball gown, and all of a sudden she is interacting with princes. So maybe one day, we'll make pathogenic cells interact like normal cells."

She has a long history of conducting interdisciplinary research and looks forward to more at the IEI. "We need to start miniaturizing, so we can work at the single-cell level rather than at the tissue level," she says. "Engineers can help with that."



A carbon nanofiber reinforced composite material taken using a scanning electron microscope

NIKHIL GUPTA

Associate Professor of Mechanical Engineering at the NYU School of Engineering

"Interfaces are very important in my field, because when you intelligently bind two materials together, you can create a better material," Associate Professor of Mechanical Engineering at the NYU School of Engineering Nikhil Gupta explains. "The new material can be designed to exhibit any number of desired properties, including strength, lightness, and thermal or electrical conductivity. Carbon nanofiber reinforced composite materials have shown especially promising properties in our recent studies."

The interface between organic and inorganic materials is one of the three areas of focus at the IEI (the others are "colloids and membranes" and "sensors and diagnostics"), so Gupta's work is a natural fit. "Typically, the polymer with which I'm working is the organic part of the equation, and the reinforcement is either organic or inorganic," he says.

The advanced composite materials he designs have applications in a variety of industries. Gupta has been working on lightweight body and vehicle armor for the military, and he points out that with new regulations concerning fuel efficiency for automobiles being enacted, it's now particularly important that automotive designers have access to lightweight but strong composites. "Automakers are being required to nearly double the average fuel economy of new vehicles by 2025," he says, "so there's plenty of work that needs to get done at the IEI to help make that happen."

STEPHEN ARNOLD

Professor of Physics and Chemistry at the NYU School of Engineering

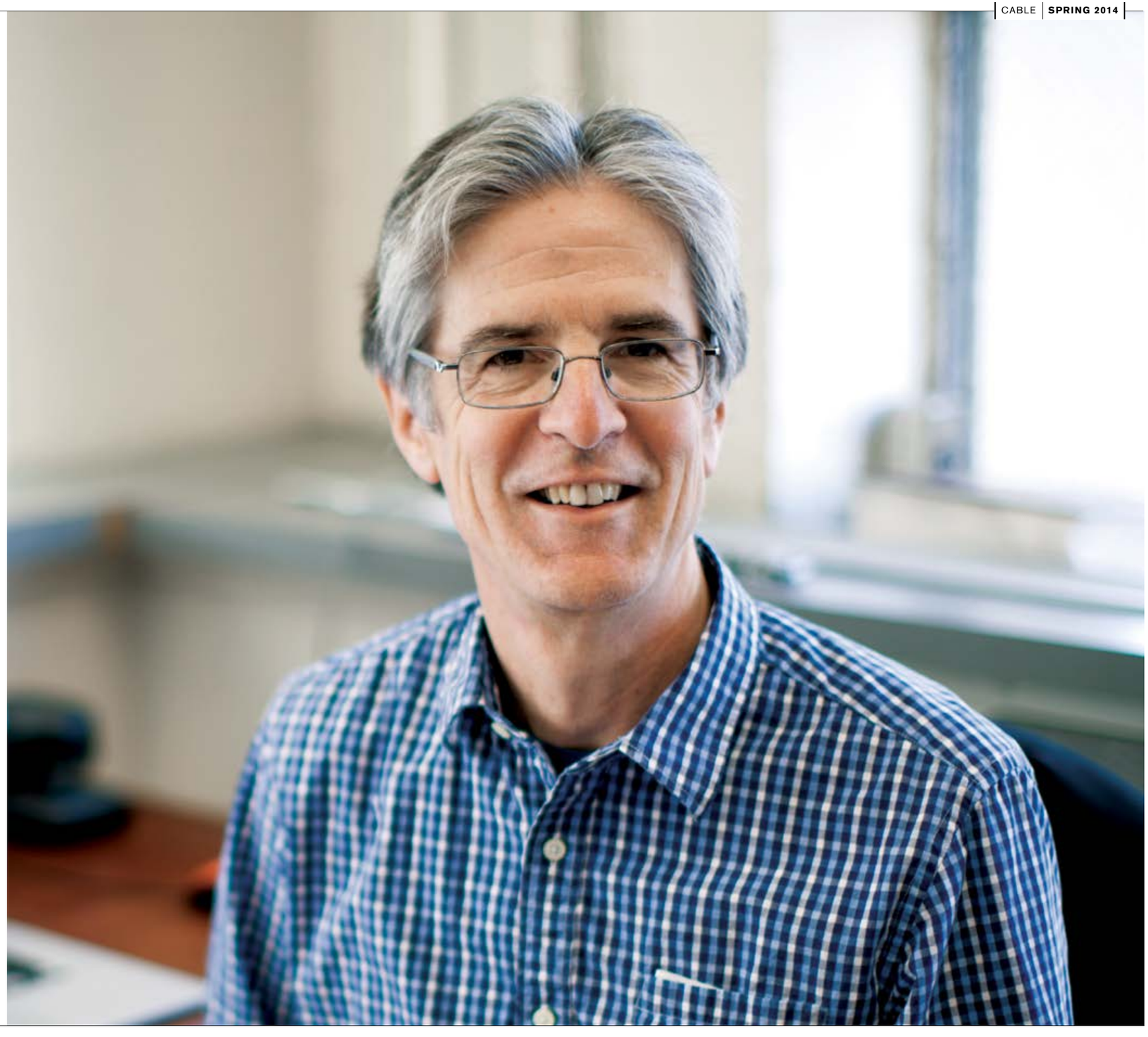
There are no resident musicians at the IEI, but perhaps there should be. It was, after all, while watching a violinist play that Professor of Physics and Chemistry at the NYU School of Engineering Stephen Arnold got a novel idea. He wondered what would happen if a dust particle landed on a violin string. The frequency, he knew, would change slightly. And what if something sticky was applied to the string that would respond only to certain types of dust?

Those thoughts led to his development of a new biosensor that set a record by detecting the smallest single virus in solution and reached a new breakthrough when it detected a single label-free cancer marker protein. (The sensor is treated with plasmonic gold nanoreceptors, which enhance its electric field and allow even the smallest shifts in resonant frequency to be detected.)

"The IEI is going to be very important in my work," Arnold predicts. "Because everything is identified at the surface, it's crucial to be able to engineer those surfaces." ■

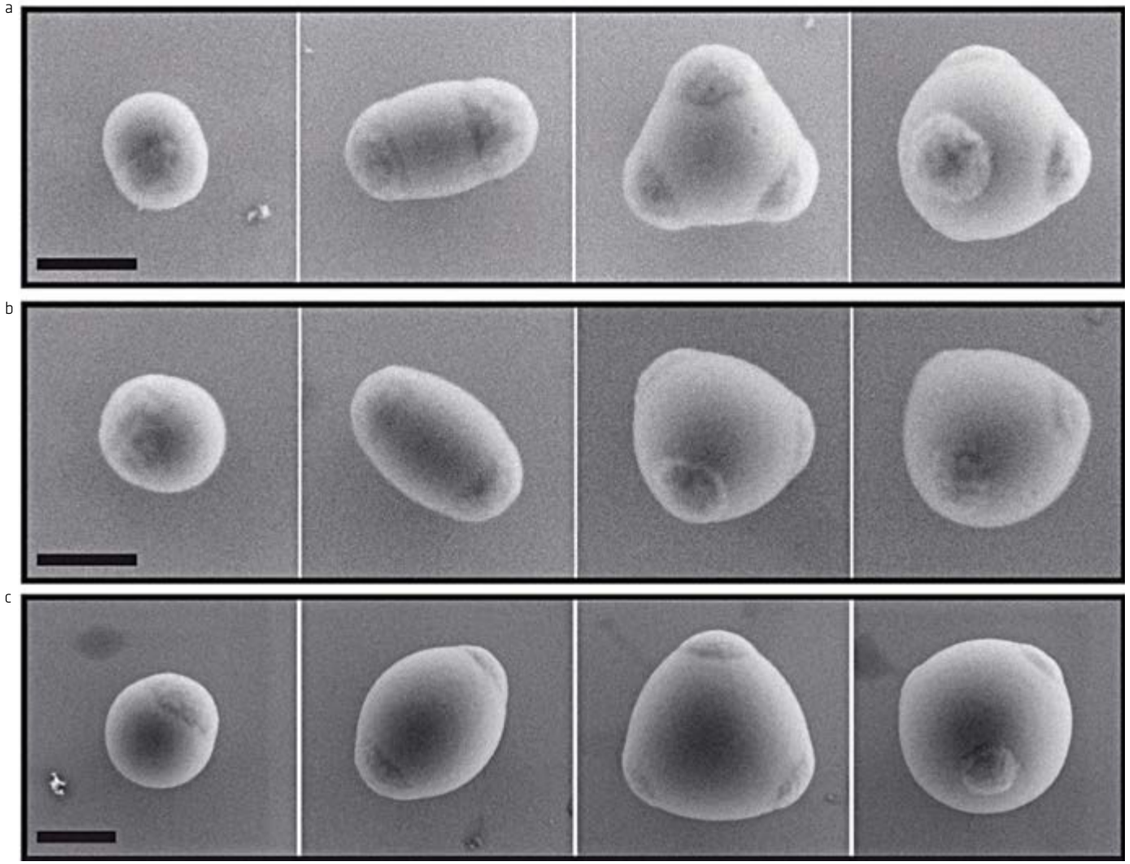
WELL CONNECTED

David Pine Joins the NYU Polytechnic School of Engineering



DAVID PINE HAS

a deep appreciation for the history of the NYU Polytechnic School of Engineering and the work that has been done in his field by its faculty. “Just look at Herman Mark, who established the Polymer Research Institute here in the 1940s,” he says. “Thanks to him, the School of Engineering had the first graduate program of its kind in America, and his Saturday morning symposia attracted some of the leading scientists in the world to Brooklyn.” Besides Mark, who is widely considered



Electron micrographs show Pine's work—in this instance a method for creating colloids with specific directional bonding—in progress.

the father of polymer science, Pine cites a list of other School of Engineering luminaries, including Donald Othmer and Joseph J. Jacobs. "Many graduates have also gone on to really noteworthy careers," he adds. "One who springs immediately to mind is Junji Kido, from the class of 1989, who has done pioneering work with organic light-emitting diodes."

While the exponential growth of other engineering fields has taken the limelight off of the Department of Chemical and Biomolecular Engineering over the years, Pine, the newly installed head, firmly believes that it could soon return to its former glory. "We have a strong advocate in Dean Katepalli Sreenivasan," he says, "and a multitude of resources, including newly renovated labs, are becoming available to us." He expects to attract an exceptionally high caliber of faculty members. "The chance to work at a school with such a rich history, especially one in an unbeatable location like Downtown Brooklyn, is going to be very appealing," he asserts.

Pine, who earned a Ph.D. in physics from Cornell University in 1982, is undeterred at being charged with such a revitalization. Effecting significant change has been something of a trope throughout his career. In the early 1990s, when he worked at Exxon Research & Engineering, soft matter physics was an established field of study in Europe but had not yet gained widespread acceptance in the U.S. (Soft matter includes complex fluids such as biological and synthetic polymers, emulsions, liquid crystals, and colloids, as well as gels and granular materials.) "Exxon was at the forefront of research in that area, and it was gratifying to be a part of it," he recalls. "I particularly like the interdisciplinary nature of the work and the chance to collaborate closely with chemists, biologists, and engineers, all of whom are abundantly available at the School of Engineering post merger with NYU."

When Pine, a California native, decided to leave Exxon for academia in 1995, he accepted a post as a professor of materials science and chemical engineering at the University of California, Santa Barbara (UCSB). "The school was on the rise, and I really enjoyed being part of that ascendence," he recalls. "Also, my office directly overlooked the ocean." The view did not, however, distract him from his teaching and research, and in 2001 he began chairing the Department of Chemical Engineering. By the time he left to come to NYU in 2005, his UCSB program had been named one of the top 10 in the country.

At NYU Pine became the founding director of the Center for Soft Matter Research, and, under his leadership, it has become one of the foremost such facilities in the world. His own research is focused on colloids, and he is adept at explaining his work to laypeople, often using easy-to-understand metaphor and every-day examples. Colloids are formed when particles of one substance are dispersed through a second substance. As common examples, Pine cites milk, in which butterfat is dispersed throughout a water-based liquid, and ink, whose components are a solid pigment and a water base.

Pine also studies dried colloidal crystals, which self-assemble into orderly stacks capable of diffracting light. Pine and his colleagues are working to synthesize new colloids in the lab that self-assemble into specific desired patterns. Among the most sought-after pattern is the diamond lattice, an intricate arrangement that involves four tetrahedra of atoms connected at their vertices and fit into a cubic form. A colloid that is engineered to self-assemble into a diamond lattice could conceivably perform optical switching and amplifying functions, acting on light much the same way a semiconductor acts on electricity.

Pine's work on colloids was featured on the cover of the respected journal *Nature* in November 2012, complete with a colorful artist's rendering of a newly created self-assembling colloid. A copy of the cover, framed for him as a gift from his family, is displayed in his office, and Pine points out that the tagline, "The New Bond," is a now-somewhat-dated play on the fact that a new James Bond film had just been released when the issue was published.

Despite his new duties as head of the department, he expects to continue devoting himself wholeheartedly to scientific enquiry. "I'm working in an exciting field at an exciting time," he says. "And the NYU School of Engineering is an exciting place to be." ■

Nature, Naturally...

Since the journal *Nature* launched in 1869, it has published a multitude of exciting and important features, including a piece on the research that led to the discovery of the electron (1897), Watson and Crick's work on the structure of DNA (1953), news of the detection of a hole in the ozone layer (1985), and the story of the first mammal—a sheep named Dolly by her creators— to be cloned from the cells of an adult mammal (1996). Few would argue that the periodical admirably adheres to its historical missions "to place before the general public the grand results of Scientific Work and Scientific Discovery; and to urge the claims of Science to a more general recognition in Education and in Daily Life" and "to aid Scientific men themselves, by giving early information of all advances made in any branch of Natural knowledge throughout the world."

In November 2012 David Pine's work joined that august company, with a cover article that celebrated his lab's discovery of a method for creating colloids with specific directional bonding—a finding that could lead to colloids with useful optical properties and possible applications in a variety of industries.

Pine and his co-authors—who included Yufeng Wang, Yu Wang, Dana R. Breed, Vinothan N. Manoharan, Lang Feng, Andrew D. Hollingsworth, and Marcus Weck—explained that designing and assembling complex three-dimensional structures from colloidal particles is difficult for scientists because of the absence of specific directional bonds: forces between colloids are almost always isotropic, meaning that they are the same in all directions, moving radially out from the particle. Thus, even though recent years had seen huge advances in the kinds of colloidal particles that could be synthesized—with scientists reporting such new shapes as cubes and clusters of spheres—their self-assembly was largely controlled by their geometry, and only a few relatively simple crystals had been made. Intricate structures like the diamond lattice, which require fourfold coordination, were impossible to engineer.

Pine and his fellow researchers had, however, developed a method for making nearly spherical colloids with small patches on their surfaces. The patches could be coated with short strands of DNA, which would then act as a sort of glue, designed to be selectively sticky based on the desired end structure. The sticky patches allowed the particles to interact only along very specific vectors (in a manner reminiscent of the connectivity of atoms in molecules), thus vastly increasing the sophistication and complexity of the resulting structures. In the future, one such sophisticated structure could be the diamond lattice, which Pine has described as something of a "holy grail" for colloid researchers. He predicts that it could be used to build a "semiconductor" for light. (Existing semiconductors act on electrons, and the new material might serve to act on photons in a similar way.) He is optimistic because, as he has told journalists, "The rules of quantum mechanics that govern the way atoms bind are fairly restrictive. We don't have those kinds of restrictions."

THE ANTI-DISCIPLINARIAN

Computer Scientist and Game Designer Andy Nealen Does A Little Bit of Everything

TO sit in Andy Nealen's office is to take a dizzying tour of academic disciplines. In a single visit, the conversation might jump from the historical separation of architecture and civil engineering, the design of the Sydney Opera House, the psychology of bounded rationality, language acquisition, to three-dimensional computer modeling. Then there are the bookshelves, crammed with topics ranging from game design to the history of Dungeons and Dragons to calculus.

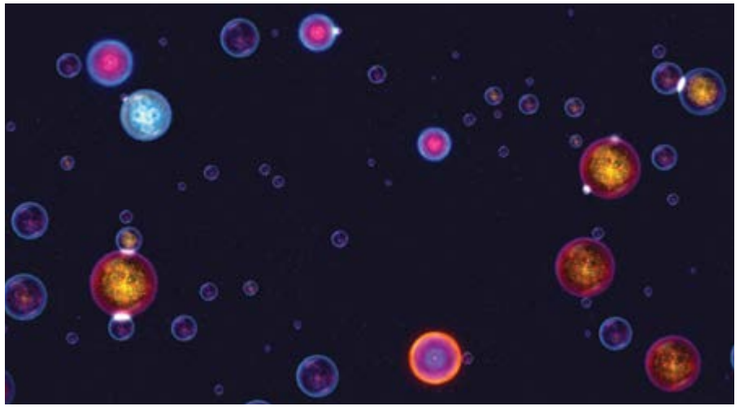
"I make no distinction between disciplines," says Nealen, an assistant professor of computer science and engineering at the NYU Polytechnic School of Engineering. "I think people who are good at their designs know a little bit about everything. Or a lot of everything."

Nealen's own academic background reflects this philosophy. Although he is now a professor of computer science at the NYU School of Engineering, he started his career as an architect and civil engineer in Germany, where he lived from the ages of nine to thirty-eight. After ten years working in those fields he grew tired of large-scale projects that had so many variables outside of his control. He decided to start over as a computer scientist with the ultimate goal of designing games. "The idea of being able to do all my experimentation and thinking on a laptop was glorious and really liberating," he says.

Magnetic Attraction

To start his career in computer science, Nealen had to begin nearly from scratch as an undergraduate. Then, his plan to go directly from there to the game industry was temporarily sidetracked by an offer to get a MS at the Technische Universitat Darmstadt, then a Ph.D. at the Technical Institute of Berlin. During his doctorate, he focused on three-dimensional modeling, although he was still able to dabble in game design. As soon as he turned in his thesis in 2007, he began collaborating with Hemisphere Games on a project, and in 2009 they launched the puzzle game *Osmos*, which collected awards including Apple's 2010 iPad Game of the Year and the 2011 Apple Design Award. The game's popularity continues even today: a few weeks ago, it was parodied on *The Simpsons*.

After finishing his doctorate, Nealen moved to the New York City area to be a computer science professor at Rutgers University, where he stayed for four years. Although he loved his department, his predilection for breaking down disciplinary borders brought him to the School of Engineering, in part drawn by the promise of the new Media and Games Network (MAGNET), which opened last September.



The ambient world of *Osmos* features dreamlike visuals and a minimalist, electronic soundtrack.

MAGNET is a multi-school colocation that brings art, computer science, and engineering into an airy shared space within the MetroTech Center commons. It includes faculty and students from the School of Engineering; the Steinhardt School of Culture, Education, and Human Development; the Tisch School of the Arts; and the Courant Institute of Mathematical Sciences. "In knowledge acquisition, I don't think tribalism is a good thing," Nealen says. "And that is why I left the comfort of a large computer science department to dive into this interdisciplinary mess. It's a beautiful mess. It's the kind of mess that's exciting."

Broad Applications

Nealen's current research at the School of Engineering focuses on three major projects. The first project involves virtual cinematography, which will automatically fill in a three-dimensional camera path based on two-dimensional camera views. Movie and video game directors could use the technology to swoop through a scene and get a sense of the layout without having to do any manual work to design the three-dimensional camera path. The project may have applications for other fields, too. For example, it may allow architects or landscape planners to automatically render blueprints into three-dimensional spaces, to allow clients a virtual walk-through.

The second is three-dimensional modeling and animation, a continuation of his doctoral work in Germany. Currently, in order to change the shape of a figure in a computer-generated scene, an animator or director must give the shape back to a modeler and wait for it to go through several iterations of design. Nealen's goal is to allow the animator or director to alter a shape directly in a scene, without going through these time-consuming additional steps. The work is tentatively scheduled to publish later this year.

Nealen's third project goes back to his love of game design—it aims to model human perception of a game's difficulty with artificial intelligence. Using the popular iPhone game *Flappy Birds*, the AI plays different variations on the game and reports back as to how hard it was to play. The technology could eventually help game designers identify which versions of their games are the most difficult, allowing them to tweak the games' parameters to find the sweet spot of both difficulty and enjoyment.

In his work at the school so far, Nealen has collaborated with the Game Center at Tisch. But his artificial intelligence project has implications for risk management and decision theory because it involves modeling how well a human can perform under pressure. This could eventually lead to joint efforts with NYU's neuroscience and economics departments.

"I'm interested in the way that an environment and audiovisual feedback impacts performance," Nealen says of these potential collaborative projects. "That is the kind of thing I want to move into."

Work and Play

Despite juggling his research and teaching responsibilities, which include graduate courses in game design and computer graphics, Nealen seeks a healthy dose of extracurricular stimulation. Back in his office, alongside his eclectic book collection, are dozens of video games, empty boxes from game consoles, and around twenty board games—overflow from the 300 tabletop games he keeps at home. His desk space is littered with more: a chessboard, a complex version of tic-tac-toe made from wood and marbles, and various card sets including, a student prototype.

These aren't just for fun. Nealen is a juror for a range of festivals that require playing thirty to forty video games a year. He is also a new board game critic at *Paste* magazine and is prototyping three board games of his own. The playtime feeds back into Nealen's programming and video game design, too. Unlike a computer game, which can hide computation in the background, a board game lays everything out in the open, requiring a refined understanding of each mechanism and how it contributes to interesting play.

So does he like his job? "Oh god," Nealen laughs. "Yes, it's the best." ■

"I MAKE NO DISTINCTION BETWEEN DISCIPLINES. I THINK PEOPLE WHO ARE GOOD AT THEIR DESIGNS KNOW A LITTLE BIT ABOUT EVERYTHING. OR A LOT OF EVERYTHING."

How To Make A Video Game

All video games start the same way: by imagining a scenario with stakes. What if the world were on a collision course with an asteroid? How many anagrams can be found in a set of letters during a short burst of time? And what kind of game might explore how such scenarios play out?

Game designers typically think of these questions in terms of their own skill sets–an asteroid game might require an understanding of physics, while anagrams might be well-suited to a Scrabble fanatic. Once the idea is strong and in line with a designer's strengths, the next step is to prototype, which is like an artist drawing a rough sketch but with computer coding and rendering instead of pencil and paper. Here, the goal is to get the outline of the game onto a computer screen.

After the prototype is solid, the next several steps work in iterative concert: controls, graphics, sound, and system. These may involve anywhere from a single person to a large team depending on the breadth of each designer's skills and the size of the project. During these steps, each change affects the rest of the game's parameters. As the designers makes improvements to the graphics, for example, they might need to tweak the original rules of the game to make shapes move a different way, which may in turn require a new musical tempo.

Once the game is in a playable state, it's testing time. Big companies like Microsoft do this through hired players in testing studios; smaller independent designers pass their work-in-progress to friends. Either way, each version of a game requires a new set of players to make sure the feedback always comes from a fresh perspective.

Finally, it's time to let people know the game exists and to make it accessible to a broader audience. Some designers work this stage into the design process by live-demoing games on sites such as Twitch.tv. Others make cheap, unfinished versions available to get people hooked early and to get feedback. But whenever a game is released, social media and press coverage are always a must to fully unleash those asteroids or anagrams into the gaming universe.

THE FUTURE WITH 5G

NYU WIRELESS and Its Director Theodore (Ted) Rappaport Are Looking into the Face of Tomorrow's Technology Today

THE SCIENCE

fiction writer Ray Bradbury said that the best science begins with romance: the idea that anything is possible. If that's true, then Ted Rappaport, of the NYU School of Engineering Department of Electrical Engineering, is a true romantic of the Information Age. The founding director of the interdisciplinary research center NYU WIRELESS has been on the leading edge of his field for more than thirty years, and he sees possibilities on the horizon that few others can.

As a kid growing up in Brooklyn, Rappaport was mesmerized by broadcasts coming from his grandfather's shortwave radio. "It was this big monstrosity mounted on a wall in his basement," he says. "I lis-

tened to Morse code and ship-to-shore, and it was fascinating to me. That's where my interest in wireless and engineering started."

Rappaport still has his grandfather's short-wave his wife had restored as a Valentine's Day gift a few years back, and from time to time he fires it up and listens to broadcasts from the United Kingdom, China, or Ecuador. He also spends his free time climbing the towers that he built outside their home in the mountains of southern Virginia and tinkering with his antennas there. ("My sanctuary," he calls it.) But one gets the feeling that free time is in short supply for Rappaport these days. Or perhaps it's just that his work and play overlap sufficiently that the distinction is nearly moot.

At 53, Rappaport has founded some of the world's biggest wireless research centers (including those at Virginia Tech and at the University of Texas in Austin) and launched and sold two companies. He has authored more than 20 books and holds around 100 patents. (His inventions have been built into modern mobile phones, used to catch cyber thieves and, he notes with clear delight, mentioned in the same breath as donuts on an episode of *Law & Order*.) Rappaport has served in an advisory or research capacity for the Federal Communications Commission, the Department of Defense, the National Science Foundation, and dozens of telecom companies. But when he talks about the future of his field, from fifth-generation (5G) wireless—widely predicted to launch in 2020—to the "information shower" that he says will likely emerge, his tone is that of someone still in thrall to the possibilities.

"There are almost too many to mention," says Rappaport. "All of the content we could ever consume in our lives will be downloaded to our portable devices as we move about. New peer-to-peer networks will emerge. I see wireless entering its renaissance as the explosion in bandwidth comes to the edge of each wireless network, allowing cell phones and computers to access data at speeds that are 1,000 or 10,000 times greater than today's fastest WiFi networks."

What will all of that mean for the average person? For starters, if you've ever had to wait for Netflix to buffer in the middle of an episode of *House of Cards*, you may be pleased to learn that it will mean downloading a full-length feature film to your cell phone in under a second. But forget the movies for a minute, and forget the panda cams at the National Zoo. Rappaport's wireless renaissance will mean downloading your entire hard drive to your phone on the go. It will mean advances in traffic control and other safety systems. Wearable devices with AI capabilities for augmented and virtual reality. It will mean no more holding your breath during an MRI, because you'll be able to see real-time imaging of your breathing lungs and beating heart—at a resolution that may leave you holding your breath anyway.

The opportunity to work "at the boundaries of wireless and medicine" in collaboration with NYU's Langone Medical Center was a large part of what brought Rappaport to the School of Engineering two years ago. "There's nowhere else in the world you will find what we have at NYU WIRELESS," he says. "It's remarkable. We have medical doctors, radiologists, surgeons, computer scientists, and electrical engineers all working together." The projects coming out of this alliance range from research on advanced imaging capabilities to "wireless implants that allow brainwaves to be received across the room."

(Yes, brainwaves. The mention of that grabs at the far corners of the imagination, at the sorts of scenarios that Bradbury speculated about in stories like "The Veldt," about a smart house gone eerily awry. But the focus of the biomedical implants project is on patient-care applications, such as detecting and controlling seizures.)

In his two short years at NYU WIRELESS, Rappaport has turned this into his biggest wireless research center yet, garnering over $8 million in new external research funding from the National Science Foundation (NSF) and 10 leading industrial affiliate companies, not counting the over $50 million of "in-force" funding at play when the research grants held by the participating faculty are counted.

Of course, the research at NYU WIRELESS spans multiple fields. Twenty faculty and more than 100 students are currently deep in research. Some are looking at ways to improve web traffic. Others are working on advancing communications technologies. Still others are developing the integrated circuits—tiny chips a universe away from that monster shortwave radio in his grandpa's basement that were invented by former School of Engineering professor Eugene Kleiner—that will be required to intercept the millimeter wave frequencies of what Rappaport has dubbed "the massively broadband wireless future."

That future, or the NYU WIRELESS research that will usher it into our lives, is being funded by governmental entities including the NSF, the National Institutes of Health, the Department of Defense, and Empire State Development. "When you have talent, money is always the easy part. That's what I've found in my career," says Rappaport. Of course, it helps when your talent is deployed on the forefront of one of the hottest industries of our time. Last year, the number of internet-connected mobile devices was estimated to exceed the number of humans on the planet, and smart phones consumed more than 90% of global mobile data traffic; it's no wonder that Samsung was the first corporation on board to fund NYU WIRELESS. The sponsors now number ten, with Straight Path, AT&T, Ericsson, Huawei Technologies, Intel Corporation, L3 Communications, National Instruments, Qualcomm Technologies, and Nokia Solutions and Networks (NSN) joining Samsung on the roster.

"Research is a contact sport; you have to be in contact with your constituency," says Rappaport. "What we're trying to do is bring the world's leading companies in wireless, computation, and medicine in to see our students and faculty and support them and develop a relationship with us." Industrial affiliates have a close working relationship with the center. They get early access to its research—and, frequently, to its job-seeking graduates. If research is a contact sport, it's also a team sport, and Rappaport is not only a star player, but a seasoned professional at assembling winning teams with an eye on both the history and the future of the game. He's enthusiastic about the infusion of new faculty and students drawn to the school by the work being done at NYU-WIRELESS, and he keeps tabs on the latest trends and gizmos, from maker culture to Rasberry Pi. But he also places a great value on the heritage of his research, much like he cherishes his antique shortwave radio. He relishes the fact that Samuel Morse, inventor of the Morse code and the telegraph, was an early professor at NYU. "That's exactly the kind of student we want to create," he says. "Creative, artistic, but also inventive: engineers." ■

The New Wave in Wireless

NYU WIRELESS and the School of Engineering play hosts to 5G's Biggest Players

The first-ever 5G Summit at the NYU Polytechnic School of Engineering brought together respected industry leaders from across academia, business, and government.

If you had any doubts that Brooklyn was fast becoming one of the hottest locales in the tech industry, look no further than the 5G Summit, held from April 23 to 25 at the New York University Polytechnic School of Engineering. Co-organized by the NYU WIRELESS research center and Nokia Solutions and Networks (NSN), the conference, scheduled to be an annual event, brought together industry leaders from across academia, business and government to explore the future of Fifth Generation–more commonly called 5G–wireless technology.

"Our vision is to make 5G a platform for innovation, a platform that can be used to improve business, life, and society," Hossein Moin, the chief technology officer of NSN, explained to the audience. Recalling the 2002 earthquake in his native Iran, Moin asserted, "Networks were set up within 24 hours, and they undeniably helped save lives. That's how powerful wireless can be."

John Stankey, the group president of AT&T, who gave a keynote address titled "Better, Stronger, Faster: Unleashing the Next Generation of Innovation," heartily concurred, and he additionally pointed out that mobile communication is a significant contributor to the global economy, projected to add more than $10 trillion to the worldwide GDP between 2013 and 2017 alone. "There is insatiable demand for mobile connectivity," he said. "No one wants to run wires or be tethered to a desk anymore."

That demand does, indeed, appear to be unquenchable. Thanks to steadily increasing levels of video gaming, Web browsing, and media streaming on mobile devices, demand for capacity reportedly doubles annually. "This is the reality, so in order to meet those demands, our future ecosystem must change and grow," Stankey said. (5G is projected to become 1,000 times faster than 4G, with the ability to handle at least 50 times more traffic.) He found no dissenters among the many attendees, who were treated over the course of the conference to discussions of such topics as the evolution of millimeter-wave technologies (from Ali Sadri of Intel) and what lies ahead for cellular system design (from Professor Andrea Goldsmith of Stanford University). Other talks centered on antenna design, 5G spectrum availability and regulatory issues, and more.

Ted Rappaport, the founding director of NYU WIRELESS and the driving force behind the landmark gathering, said, "The Brooklyn 5G Summit has brought together the top minds from around the globe to accelerate our drive for wireless communication solutions." He continued, "It's gratifying to see so many of the industry's leaders working together to address the challenge."

The Institute of Electrical and Electronics Engineers (IEEE), the world's largest engineering organization, provided live coverage of the event through its television network, enabling those who could not attend the chance to hear the vital information being discussed. Katherine Fleming, NYU's deputy provost, stressed the value of that information when she formally welcomed the participants. "NYU is proud to be hosting you," she said. Recalling that as a child she was sometimes admonished for fiddling with rubber bands or other such activities with the warning that "small minds engage in small activities," she proclaimed, "Today, we are seeing big minds engage in incredibly big activities."

Equally complimentary was New York State's Lieutenant Governor Robert Duffy, who addressed the assembled over lunch. "I'm just an end user of what you're creating here," he quipped. "And speaking as someone who simply wants to hit a button and have my device work, I find the synergy and talent in this room awe-inspiring. You are truly helping to change the world."

MELANCOLIA AND MAGIC SQUARES

David and Gregory Chudnovsky Discuss Math, Art, and More

WHEN someone is particularly passionate about a given topic, it's not uncommon to hear them being described as "eating, breathing, and sleeping" it. In the case of David and Gregory Chudnovsky, it would be fitting to say that they, quite literally, stand on it. The brothers, mathematicians at the New York University Polytechnic School of Engineering, share an office whose floor features a large reproduction of Albrecht Dürer's *Melencolia I* (a 1514 engraving that depicts a winged being holding a caliper and surrounded by various other tools associated with geometry). The figure's dejected mien, Gregory Chudnovsky quips, is one often seen on mathematicians trying to solve seemingly unsolvable problems.

Despite the joke, the brothers, who are interested in the branch of pure mathematics known as number theory, are generally far from dejected. "The harder the problem, the more fun," they assert. "In mathematics, no one wants to focus on the low-hanging fruit. They want to work on the problems that have stumped others for ages." The two are perhaps best known to the general public for their work on one such problem: calculating the mathematical constant known as pi, the ratio of a circle's circumference to its diameter. By the early 1990s, they had computed pi, referred to by most laypeople and non-mathematicians using only two decimal places (3.14), to more than four billion places—at the time an astonishing, record-setting number. They did so with the help of Mo, a supercomputer they designed

A portion of the floor at IMAS displays a large digital image showing more than 100 different identities, many discovered by the Chudnovskys themselves.

and built in Gregory Chudnovsky's apartment, using mail-order parts and PVC piping from Home Depot.

The Chudnovsky brothers are still involved in supercomputing and their smallest computers are at their Institute for Mathematics and Advanced Supercomputing (IMAS), which was endowed for them at the NYU School of Engineering in 1998. (A portion of the floor displays, in addition to the Dürer reproduction, a large digital image showing more than 100 different identities, many discovered by the Chudnovskys themselves.) They explain that because of Moore's Law—the prediction that the number of transistors incorporated in a chip will increase exponentially at a steady rate—chip design keeps them exceptionally busy. (The two work on a process called very-large-scale integration or VLSI design, creating integrated circuits by combining many billions of transistors into a single chip.) Each of their projects takes some two-and-a-half years, from conception to manufacturing, and each chip goes through several iterations and a grueling process of formal verification. Because of the intricacies of the development and manufacturing process, many things can go wrong; even a speck of dust can stymie the entire process. Pointing out that visitors to IMAS have to don only surgical booties over their shoes in order to protect the artwork on the floor, they say, "If you were to go near one of the cleanrooms used in the semiconductor industry, you would have to wear a full hazmat suit."

They see the chips they are designing as part of an important continuum. "Think about life now and compare it to life 50 years ago," they say. "Almost any major difference you can think of is due to semiconductors and computer chips." Designing such complex and powerful chips is akin to planning a city—in miniature—they explain: "The smaller the features, the more complicated the mathematics gets. You must optimize the wiring, where components are placed, and the whole thing." A computer, they remind listeners, is simply a hardwired set of mathematical rules.

Mathematics, the Chudnovskys enthusiastically declare, is a universal language required not just for computing but almost everything. "If you know math, you can do absolutely anything," they both assert. The brothers are fond of the tale of the great 19th-century mathematician Josiah Willard Gibbs, who famously objected when administrators at Yale decided to stop requiring the study of mathematics in favor of Latin. "Mathematics is the language," Gibbs had protested, and the brothers concur. "You use number theory every day, even if you don't realize it," David Chudnovsky says. "A cell phone requires number theory and algorithms. So does the television. It's all mathematics in the form of digital signal processing." The pair are quick, however, to praise the work of engineers, and they single out the NYU School of Engineering's Department of Electrical Engineering, which they call "the best in the entire region."

In addition to their admiration for engineers, the brothers hold artists in exceptionally high esteem, as evidenced by their love of Dürer, who was also, not at all incidentally, a mathematician. In honor of the 500th anniversary of *Melencolia I*, the Chudnovskys organized a conference, "500 Years of Melancholia in Mathematics,"

Art and Math Meld Yet Again

In 1998 the seven intricate tapestries that make up the famed "Hunt of the Unicorn" series were moved from their longtime home at the Cloisters, New York City's museum of medieval art, which was being renovated. Sent to the Metropolitan Museum of Art, which runs the Cloisters, they were cleaned and then painstakingly photographed, section by section, for archival preservation. Curators later tried to assemble those digital files, which filled more than 200 CDs, into a complete image, but were unable to match up the thousands upon thousands of fibers within the sections. Frustrated, they declared the problem unsolvable and shelved the project.

In 2003, however, a Met curator happened to meet David Chudnovsky at a social gathering, David and brother Gregory subsequently agreed to take on the challenge. They discovered that there had been movement in the 500-year-old fibers of the tapestry they were examining—which had apparently begun to relax and shift during and after the cleaning—and created a vector displacement map (with some 15,000 arrows) to track the motion. They then devised a set of equations to optimize the position of all 240 million pixels in the images. As portions of the tapestry were entered into the supercomputer, it performed some 300 million operations per pixel to digitally "weave" the fibers back together. Finally, after four months of work, the Chudnovskys entered the final data into the system, and after 30 hours of continuous running, their supercomputer had successfully performed the 7.7 *quadrillion* calculations needed to put together a flawless multigigabyte image of "Unicorn in Captivity," the tapestry that depicts the mythical creature loosely tethered to a tree behind a low circle of fencing.

A copy of the artwork currently hangs in the Bern Dibner Library at MetroTech Center, reinforcing the connection between the arts and engineering.

"YOU USE NUMBER THEORY EVERY DAY, EVEN IF YOU DON'T REALIZE IT. A CELL PHONE REQUIRES NUMBER THEORY AND ALGORITHMS. SO DOES THE TELEVISION."

which took place on May 17 at the school. The event—which was made possible by a generous grant from the Alfred P. Sloan Foundation, as the brothers very gratefully acknowledge—featured the world's leading experts, including John Conway and Sergiu Klainerman (Princeton University), Jeffrey Lagarias (University of Michigan), John W. Morgan (Stony Brook University), Richard Schroeppel (Sandia National Lab), Richard Stanley (MIT), and Günter Ziegler (Free University of Berlin).

Many of their talks included discussions of magic squares and polyhedra, items featured prominently within Dürer's iconic etching. (The engraving itself is displayed at New York City's Metropolitan Museum of Art, and the day after the conference, the museum hosted a Sunday at the Met program, "Spotlight on a Masterpiece: Albrecht Dürer's *Melencolia I*," which featured a series of lectures by curators and historians.) *Melencolia I* depicts what is thought to be the first example of a 4x4 magic square ever published in Europe. Magic Squares consist of a series of numbers arranged in a square in such a way that the sum of each row, each column and both the corner diagonals adds up to the same sum, which is called the magic constant—in this case, 34—Dürer's age when he did the engraving. (The two numbers in the center of Dürer's bottom row, 15 and 14, represent the date of the engraving.) The engraving's eight-sided polyhedron (consisting of two equilateral triangles and six irregular pentagons) bears the faint image of a human skull and has spawned dozens of scholarly treatises examining not only its geometrical significance but its possible artistic symbolism.

Dürer's dual interest in mathematics and art led to his 1525 publication of the seminal book *Underweysung der Messung* ("Painter's Manual"), one of the first ever to teach the methods of perspective, which he had learned in Italy. (The book featured the earliest known examples of polyhedral nets—polyhedra unfolded flat for printing.) David and Gregory Chudnovsky believe that more students, even those who don't consider themselves "good at math," should try to incorporate mathematics into their studies in a similar manner. "It's schizophrenic," Gregory Chudnovsky says, "this separation between the humanities and mathematics and the sciences. Young people should try to emulate Dürer." ■

CLASS NOTES

Robert R. Williams '51AE, '64CE, '71CE

Upon graduation in 1964, Robert worked for the New York City Transit Authority for a year before changing to the New York State DPW. In 1968 he accepted a commission as a second lieutenant in the US Public Health Service assigned to the Indian Health Service where he served at various locations throughout Arizona and South Dakota for seven years before accepting an assignment to the US Environmental Protection Agency (EPA) Region 2 serving as Section Chief for the Drinking Water Program. After 30 years of service in the US Public Health Service Robert retired in 1996 at the rank of Captain. Since retiring, he has been working part time under an EPA contract providing technical assistance to the seven federally recognized Indian Nations in New York State on drinking water and waste-water issues.

Marvin Gang '56EE, '58EE

Marvin and his wife, Shirley, were guests at a Super Bowl party hosted by fellow alum Gary Ogin ('69) and his wife, Roni, at their Denver home. Bob Kleinfeld ('60) also attended. Despite the final score, a good time was had by all.

Frederick Moritz '56EE, '63EE

Frederick published the book *Electromechanical Motion Systems—Design and Simulation*.

Carl Nelson '59IE

Carl worked for IBM from 1970 – 1992. He worked as a consultant to IBM from 1992 – present. Carl has also been an ordained minister since 1986.

Anthony Veneruso '64EE

Since graduating in 1964, Anthony got married and worked at Sandia Labs. He also received a PhD in Engineering and worked on solar, wind, and geothermal energy. Anthony left Sandia to work in oil well technology for Schlumberger in Texas. He has over 20 patents and papers in oilfield technology. Andy and his wife lived and worked in France for 10 years. Now, as of 2014, they are back in Houston, TX and have 5 grandkids spread across the US.

William Gardner '70MA, '74MG

William is getting ready to retire after 43 years in the insurance business.

Robert Schmidt '70PH

As a pilot, Robert reached the FAA mandatory retirement age of 65 in Nov. 2013. He then retired from United Airlines after 35+ years flying "the Friendly Skies." Ever since graduating from Brooklyn Polytechnic, Robert had a great career with United as well as in the Air Force and is also retired from the Air National Guard. He truly enjoyed going to work and has no regrets in choosing a flying career or the path on which it took him.

Michael J. Walsh '77CE

Maj. Gen. Michael J. Walsh is now the Director of Water Resources and Coastal Resiliency at Dewberry, a privately held professional services firm. In his most recent position from 2011 to 2013 as Deputy Commanding General for Civil and Emergency Operations for the U.S. Army Corps of Engineers (USACE), he was responsible for a $10 billion annual program supervising all civil works activities nationwide, and 24,888 employees who operate and maintain infrastructure valued at $232 billion. Walsh served his country for more than 36 years. He received his Master of Building Construction degree from the University of Florida, and his Bachelor of Science degree in Civil Engineering from the Polytechnic Institute of New York.

Jean Fontaine '82ME

Jean is a Freelance Facilities/HVACR/Energy Engineer. He has over 25 years of facilities engineering experience specializing in Heating/Ventilating/Air-Conditioning/Refrigeration (HVACR) design, testing/commissioning, operations and maintenance in the nuclear, pharmaceutical, chemical and commercial buildings industries. Jean also has over five years of energy engineering experience with an energy utility company.

Kenneth Montoro '96CS

Since graduation, in August 2013, Kenneth started coming to MetroTech daily to work within Prime Services/Equity Financing I.T. at JPMorgan Chase (in the Chase building). He feels that a lot has changed at MetroTech since he graduated, but it feels like he never really left.

Robert Ilardi '01IM

In May 2014, Robert accepted a position as Executive Director of Risk Technology at JPMorgan Chase managing the design and development of the new strategic Risk Data Distribution Platform.

Garth Harding '10MS

Garth is currently considering attending law school, where he would specialize in Federal Disability Law. In addition to his studies at the George Westinghouse Vocational and Technical High School and the NYU Polytechnic School of Engineering, his background includes time as an ROTC student and an auxiliary member of the NYPD.

Bilal A. Noorani '13IE

Bilal recently joined Accenture, LLP in Sacramento, CA as a Business and Systems Integration Analyst and recommends investing time in developing a personalized NYU network for absolutely positive ROI.

IN MEMORIAM

Walter L. Hermes '50 '53
Allan Stillman '40
Lawrence G. Kurland '63
Nevio P. Coren '68
William W. Fenn '68
A. Henry Morgan '46
Howard Brenner '54 '57
Thomas Paige '41
Chever L. Kellogg '59
Alexander French '49
Anastasios T. Pappas '59
Albert H. Steinberg '56
Charles J. Knuth '44 '47 '49

Retraction:
Paul Gugliotta '85

HERBERT J. BILLINGS

Herbert J. Billings passed on Sat., October 27, 2012, age 91, in the company of his daughter and son. He was married 61 years to Marie Fortier (deceased 2003); also predeceased by daughter Cecilia Lyles (2003) and grandson J Daniels (2005), but is survived by daughters Carolyn Abrams, Sacramento; Barbara Gressner, Fremont; Jeanne Bowman, Gresham, OR.; son-in-law Devron Lyles, Oakland; Catherine Billings, Moraga; and sons Matt Billings, (Sharon), Pleasanton; and Mark Billings (Yvonne), Antioch. Also survived by 14 grandchildren, 20 great-grandchildren, and 2 great-great-grandchildren.

Herbert was born, raised, and educated in New York, attending Polytechnic Institute of Brooklyn, and USNA Grad School before joining our fighting forces in World War II as a Lieutenant supervising ship construction and repair at the Brooklyn Naval Shipyard, Puget Sound Naval Shipyard, and in Cristobal, Panama Canal Zone, preparing aircraft carriers for transit through the Canal. His wife Marie and daughter Carolyn joined him to Panama. They relocated to the Bay area in 1947, and remained ever since.

After working at Alameda and SF shipyards, he was hired EBMUD in 1948 as a civil engineer in a temporary capacity. His "temporary" position lasted for 37 years. He retired as Manager of Engineering Services in 1985, while raising 7 children and remaining active in the community. His various volunteer efforts included designing a church and overseeing its raising, arbitrator for the American Arbitration Association, serving on the Alameda County Grand Jury, the San Leandro Building Code Board of Appeals, Chair of ASCE SF Section Disaster Response Team (specializing in earthquake damage assessments), and tutoring for San Leandro Project Literacy from 1984 until recently.

His hobbies included photography, hiking, bicycling, and various travels (USA, Canada, South America, throughout Europe, Hong Kong, and Macau). He also established the Marie F. Billings Scholarship Trust for needy students at Assumption School, San Leandro, in 2008.

He created many fond memories for us: for one, he never shared his ice-cream from Fenton's but otherwise was very generous with his family and a variety of charitable organizations. He enjoyed his retirement and did everything on his bucket list. He enjoyed his many cars over the years and also used his 1980-vintage computer until it ceased working in 2010. Herbert Billings was a very quiet, fair, non-judgmental, and focused person and will be missed so much by all of us.

Visitation begins Sunday 11/04/2012 2:00 P.M. to 4:00 P.M. at Church of the Assumption 1100 Fulton Ave. San Leandro with the Vigil Service commencing at 2:30 P.M. The Funeral Liturgy celebrating his life will be in Monday at 10:30 A.M. also at the church. Interment Lone Tree Cemetery, Hayward. ■

*Originally appeared in *Inside Bay Area*

JAMES VINCENT TOTO

It is with deep sadness that we report the passing of distinguished alum James Vincent Toto ('56) on December 13, 2013. A native of the borough, Toto had attended high school at Brooklyn Tech, where he discovered a love of civil engineering. Encouraged by his parents, who had come to the U.S. from Sicily, he entered what was then called the Polytechnic Institute of Brooklyn, becoming one of the many stellar students at the school who were the children of immigrants or the first in their families to attend college.

After graduating, Toto, who later earned a master's degree in civil engineering from Columbia University, embarked on a long and rewarding career that included a partnership at Dames & Moore. There he greatly expanded the firm's capabilities in environmental consulting, particularly with respect to regulatory compliance following the National Environmental Policy Act of 1969 and its subsequent legislation and regulation. He retired in 2004.

An active member of the American Society of Civil Engineers, Toto served as an advisor and mentor to many young employees of his company. Throughout his life, he maintained a close affiliation with his alma mater, and in 2006 he proudly participated in the Class of '56 Golden Jubilee.

Our heartfelt condolences go to his wife, Addie; his children, Carolyn, Chuck and James; his many grandchildren; and the rest of his large and loving family. ■

LESLEY MILLMAN SIBNER

The NYU Polytechnic School of Engineering mourns the passing on September 11, 2013 of Lesley Millman Sibner, a professor of mathematics who served as a trusted advisor and beloved mentor to many students. Sibner, who was elected a fellow of the American Mathematical Society in 2012, had, perhaps, a more colorful educational trajectory than that of most mathematicians. Passionate about the theater, she enjoyed a brief career as an actress and in 1959 earned a bachelor's degree in fine arts from the City College of New York. It was while taking a required calculus course meant for liberal arts majors that she discovered her interest in mathematics, and she subsequently enrolled at NYU's Courant Institute, from which she received a Ph.D. in 1964.

After a short time spent as an instructor at Stanford University (1965–1966) and as a Fulbright Scholar at the Institut Henri Poincaré in Paris (1966–1967), she joined the faculty of the NYU Polytechnic School of Engineering, where she remained for most of her career. Additionally, she undertook visiting professorships at the Institute for Advanced Study in Princeton, Harvard University, the Institut des Hautes Études Scientifiques in Bures-sur-Yvette, the Max Planck Institute in Bonn, and the Institut de Mathématiques de Jussieu in Paris, among other organizations.

Sibner's research interests included non-linear partial differential equations and gauge field theory. She often worked with her husband, Robert, a fellow mathematician, and each was known for generously crediting the other when authoring papers together.

Our entire community extends its condolences to her family, friends, and the former students who so deeply miss her. ■

SAVE THE DATE!

For These Upcoming Alumni Events at NYU and the School of Engineering

Pre-NYU Alumni Day School of Engineering Cocktail Reception and Tour
Brooklyn, NY
November 7, 2014

NYU Alumni Day
New York, NY
November 8, 2014

To find out what alumni events are happening throughout the year, visit alumni.nyu.edu.

NYU School of Engineering alumni at the 2014 Family Day. This year's speaker was NYU Trustee and Polytechnic Board Member Charlie Hinkaty '70 '72.

The PIAA election results are in!

Congratulations to our newly elected International Board of Directors, which will begin its term on July 1, 2014:

Walter Alvarado '90 '97
John Artise '70
B. Jenny Chon '86
Brian Gill '11
Nikolai Wolfe '09 '11

Thank you to our outgoing IBOD members whose term ended on June 30, 2014:

Edward D. Manzo '72
Konstantinos "Gus" Maimis '84
John Genuard '85
John Yankovich '91

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Do we have your current contact info?
Update your e-mail address at **http://engineering.nyu.edu/alumni/update-your-info**
Don't miss out on exciting news and invitations to alumni events!