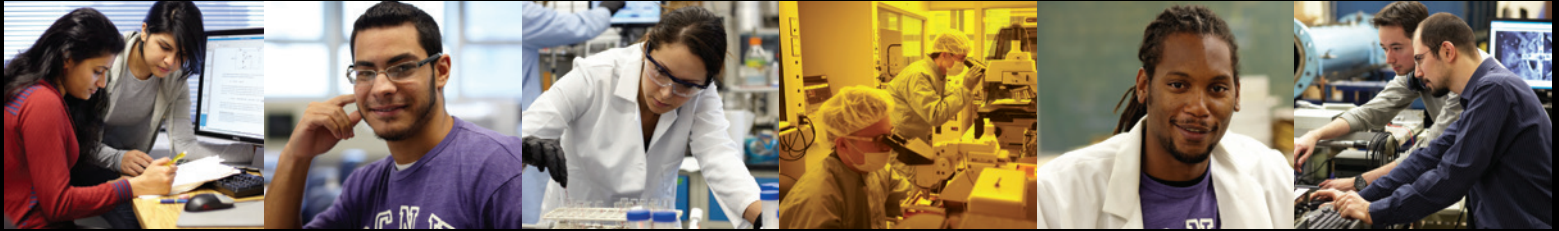


11/12 ANNUAL REPORT · THE GROVE SCHOOL OF ENGINEERING



THE FUTURE IS ENGINEERED HERE

Mission

To be an institution of national preeminence among schools of engineering and computer science schools, recognized for the excellence of its research and instructional programs;

To provide readily accessible graduate and undergraduate education in a broad range of fields to a highly diverse student body, including traditionally underrepresented minorities, women, working adults and immigrants;

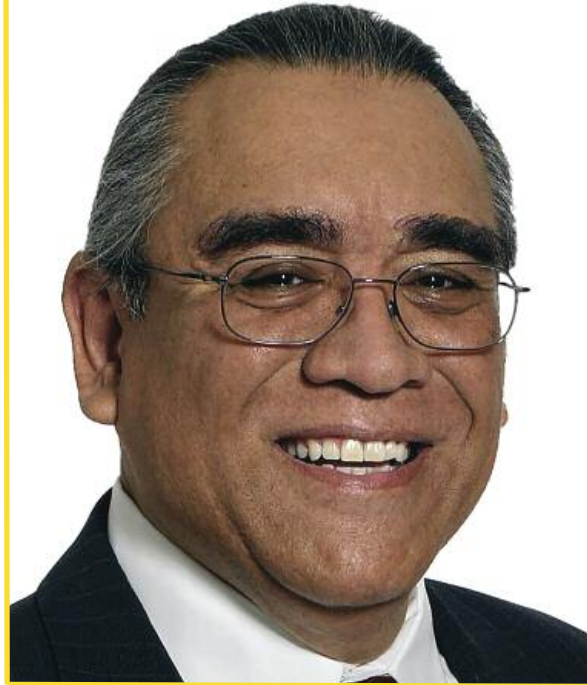
To maintain and expand a program of fundamental and applied research in areas of national interest, particularly in technologies with relevance to New York City, its metropolitan area and New York State;

To provide public service and continuing professional education to our local community, New York City and State, the engineering and computer science professions, and society at large.

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From the Dean



Each year, writing this letter for the Annual Report provides me with an invaluable opportunity to take stock of the GSOE's accomplishments in the preceding year and to contemplate the exciting prospects of the year to come. As described in the pages that follow, this past academic year was stellar in many respects, marked by the arrival of outstanding new faculty and staff, a continuation of our record of significant accomplishment in research, remarkable student achievements, and a very gratifying level of alumni support.

Our students continue to achieve remarkable success. Department of Biomedical Engineering graduating senior, Johnson Ho, the GSOE valedictorian, received a Goldwater Award in recognition of his outstanding research. This year he has enrolled in an MD/PhD degree program in Neuroscience at SUNY Downstate and has given every indication that he will go on to a brilliant career in original biomedical engineering research. Four of our recent alumni, including a member of the class of 2012, received NSF's ultimate student accolade, the Graduate Research Fellowship, and are attending the nation's most prestigious graduate schools.

The Grove School is expanding research in areas where it is an acknowledged leader and breaking new ground in emerging transformational fields. Awards ranged from the \$15 million refunding of NOAA-CREST, now entering its second decade, to new NSF and corporate support for the establishment of the Center for Metamaterials. Basic research is coupled with a surge in translational entrepreneurship, with a growing number of faculty forming companies to turn their discoveries into marketable products. On the institutional level, a \$4 million grant from the U.S. Department of Education will enhance our joint-degree programs with Hostos and LaGuardia Community Colleges preparing transfer students to succeed in City's rigorous STEM programs.

A good deal of energy this year was focused on expanding international educational opportunities. We are very much aware that it is imperative for the success of our graduates that they be fully prepared to operate in a global environment. To that end, we have developed internships abroad with companies such as IBM and international educational exchanges, such as those sponsored by the Global E³ consortium, to provide research and study



abroad opportunities for our students. Our faculty is developing contacts around the world, leading to research projects and articulation agreements with universities in other countries.

Finally, I am extremely delighted to report that the Grove School's emphasis on entrepreneurial education took a major step forward in mid-October with the opening of the Zahn Center. The facility is supported by a \$1 million gift from the Moxie Foundation, the charity of CCNY alumnus Irwin Zahn, '48, and a \$440,000 grant from the Office of Manhattan Borough President Scott Stringer. The Zahn Center, which you will hear a great deal more about in years to come, will also serve as a business incubator for aspiring student and faculty entrepreneurs and a resource for local businesses. In addition, the Moxie Foundation gift will be used to establish the Zahn Prize for Excellence in Entrepreneurship, a student competition. The support of the Manhattan Borough President recognizes the ever-expanding role that the Grove School has in promoting business and job creation in the local economy and beyond.

This is also a year to rejoice in our alumni. Graduates from all decades are distinguishing themselves, and we are particularly proud that two of our most devoted graduates, Harvey Kaylie '60EE and Edward Plotkin P.E. '53BCE, '56MCE, have been awarded the Townsend Harris Medal, CCNY's highest honor. They exemplify the unstinting support which has been crucial to the Grove School's success.

Sincerely,

Joe Barba, Dean

Marvin Sambur, PhD '68EE Receives the Engineering Alumni Career Achievement Award

Like many a brilliant New York City high school student, Marvin Sambur came to CCNY because it was free. Not wanting his family to go into debt, he chose City over an Ivy League university, a decision he has never regretted. "At City," he says, "the professors who taught us had written the textbooks. The courses, whether on established science or emerging fields like transistors and semiconductors, were very demanding." It was the sixties, and Dr. Sambur remembers humanities majors on South Campus strumming their guitars. Not so the engineering students. "We were always in class or the library," he says. Dr. Sambur did, however, find time to excel at lacrosse and soccer and was elected to the City College Hall of Fame.

Dr. Sambur's career has included major research achievements and top leadership positions in industry, government and academia. For over 40 years, the ethos of hard work which City promoted has never left him, nor has his conviction that the education it provided has been the key to his success. "It was a challenge to get in to CCNY and a challenge to stay in and graduate. I am happy that the College is renewing its emphasis on excellence."

"It was a challenge to get in to CCNY and a challenge to stay in and graduate. I am happy that the College is renewing its emphasis on excellence."

Marvin Sambur

After City, Dr. Sambur went to MIT and found that he had already covered much of the master's level material as an undergraduate. He earned his PhD in 1972 and worked in AT&T Bell Labs' Signal Processing Research group before moving on to a 24-year career at ITT Corp. He rose to become President and CEO of ITT Defense. The giant company thrived under his stewardship, and he is recognized in the domestic and international defense industry as one of the leading minds in defense electronics. His significant contributions in speech recognition, speaker identification and satellite communication systems have resulted in many patents and over 50 papers in refereed journals.

After the jolt of 9/11, Dr. Sambur sought to put his defense industry expertise at the service of his country. He was appointed Assistant Secretary of the US Air Force for Acquisition. Over four years, he formulated and executed a \$220 billion Air Force investment strategy to acquire systems and support services to provide combat capability to joint warfighting commanders. He brought systems engineering into all stages of the Air Force acquisition process – a major transformation.

Today, Dr. Sambur is Professor of the Practice with the Institute for Systems Research (ISR) at the University of Maryland's Clark School of Engineering. He assists ISR faculty and staff in developing research and educational programs and collaborations with industry and government agencies. "US Education," he says, "must rise to the challenge of equipping our students with skills equal to those of the well-prepared international graduate students coming to our universities. It will be hard work, but it is urgent and critical." Dr. Sambur serves on numerous boards and is CEO of the premier consulting company in the aerospace defense arena, Burdeshaw Associates, in Bethesda, Maryland.





“In you, your Alma Mater has particular reason to rejoice.”

The Townsend Harris Citation

Harvey Kaylie '60 EE and Edward S. Plotkin, P.E., '53 BCE '56 MCE: Two Devoted Engineering Alumni Become Townsend Harris Medalists

Townsend Harris Medals are awarded to CCNY Alumni for outstanding postgraduate achievement in their chosen fields. It is always a source of tremendous pride for the Grove School when these honors go to engineers. There is, however, a special reason to rejoice when the recipients are alumni who have a history of devotion to the School. This is true of both Harvey Kaylie and Edward S. Plotkin.

HARVEY KAYLIE '60EE has inspired the Grove School to make entrepreneurship a cornerstone of its program. His major gifts have endowed the Kaylie Prize for Entrepreneurship at City College (see page 10), which challenges students to generate ideas and translate them into real products. Mr. Kaylie serves on the board of The City College 21st Century Foundation. He holds a prominent place on the Wall of Honor in Steinman Hall. Mr. Kaylie received the honorary degree Doctor of Science at the College's 2012 commencement.

By supporting entrepreneurship, Mr. Kaylie is helping CCNY students accomplish what he did on his own. Having worked his way through City, he joined ITT Missile Systems division, and pursued his master's at NYU in the evenings, earning his MEE in 1962. After acquiring further experience in semiconductors and industrial electronics, he founded Mini-Circuits to design, manufacture and distribute frequency mixers. It was 1969, and the fledgling company occupied a modest storefront. Today, it is a world leader in RF and microwave products, with facilities in four states, the United Kingdom, Israel, India, Malaysia, China, Taiwan and Indonesia and sales in over 47 countries. Mr. Kaylie has many technical papers and patents to his credit. The publication "Microwaves and RF" has named him one of 45 people who have most shaped the microwave industry, and designated him a Microwave Legend.

Mr. Kaylie's wide-ranging philanthropy emphasizes education, people with disabilities, medical research, the disadvantaged, and the arts. He serves on the Board of Overseers of Weill Cornell Medical College, and the boards of Yeshiva Har Torah and Camp Kaylie at Ohel, among others. He and his wife Gloria have established the Harvey and Gloria Kaylie Foundation, Inc., and passed their interest in philanthropy on to their children and grandchildren.



EDWARD S. PLOTKIN, P.E., '53BCE '56MCE has made many important contributions to his Alma Mater. These include serving as CCNY Engineering School Alumni President and Alumni Association Director and, along with his wife Frances, making significant gifts, which have earned them a place on the School's Wall of Honor.

In the course of a brilliant career, Mr. Plotkin has left his stamp on infrastructure projects across the Northeast. As vice president of the tunnel constructor MacLean Grove, he was project manager for construction of the 63rd Street cross-town subway section in Manhattan; two new Washington Metro stations; a new cavern station for the Boston subway; and a section of the NYC DEP water tunnel. In the 1970s, he was assistant director and consultant on the 2nd Avenue subway, and in 2000 consulted on the new 2nd Avenue line.

Mr. Plotkin has also distinguished himself in government and education. He served as Westchester County's Commissioner of Public Works, with responsibility for designing, constructing and maintaining county roads, bridges, prisons, hospitals, college and office facilities, and administering a \$250 million annual capital programs budget. Since 1965, he has chaired the planning board of the Hudson River village where he lives. As an adjunct professor of environmental science at Mercy College, Mr. Plotkin teaches at the Sing Sing Correctional Facility.

Mr. Plotkin is a Fellow of the American Society of Civil Engineers and Life Member in the New York State Society of Professional Engineers; Honored Member in the Underground Construction Association of the Society of Mining Engineers, the Municipal Engineers of NYC, and The Moles, a fraternal organization of the heavy construction industry, which is the most prestigious group of its kind in the world.

Charles Sosa '11: For a Young Nuclear Engineer, a Battle Won and a Dream Fulfilled



Against many odds, Charles Sosa is fulfilling his dream of a career in engineering and science. He is beginning his doctoral studies in Nuclear Engineering and Radiological Sciences at the University of Michigan, the most prestigious program of its kind in the nation.

For Charles, getting to this point has been fraught with challenges. He suffers from rheumatoid conditions which cause severe joint and muscle pain. His disabilities made it hard for him to complete his high school assignments in a timely fashion, despite his intense motivation to do so. Both he and his mother felt that the system was writing him off. Despite these issues, Charles insisted on taking honors classes, and a turning point came for him when he enrolled in CCNY's STEM Institute. Along with another 20 carefully selected high school students, Charles spent the summer being exposed to

research and a choice of classes in calculus, algebra, biology, chemistry, computer methods, and engineering.

The experience was a revelation. Thanks to the mentorship of Dean Joe Barba, Otto Marte, and Victor Flores, Charles was reinforced in his belief that he could tackle the most challenging work, if given the time to do so. His mother then convinced his high school that he should be home schooled, so that he could work on a flexible schedule which accommodated his disabilities, and he was launched on his path to success.

After CCNY-STEM, coming to the Grove School was a natural move. At City, Charles felt totally supported by the College's AccessAbility Center. He pursued his studies with vigor, immersing himself in math with Dr. Sean Cleary and in mechanical engineering with Dr. Latif Jiji. It was, however, when he began to study with Dr. Masahiro Kawaji, that he found the discipline which would become his passion: nuclear engineering. Charles, however, did not limit himself to academic achievement. He was determined that he could lead, and proved as much by being active in ASME and co-founding the American Nuclear Society section on campus.

Following his graduation from CCNY, Charles interned at Idaho National Laboratory and Oak Ridge National Laboratory. He received a GEM PhD Engineering Fellowship to support him through his doctoral studies. His credentials for admission to Michigan were so outstanding that the university also offered him five years of full financial support. As Charles looks ahead to a brilliant future, he stays in touch with Dean Barba every step of the way, and he always remembers how CCNY-STEM and the Grove School made it all possible.

Dr. Jorge Gonzalez: An Expert in Climate Change and Energy Forges International Partnerships



Since arriving at the Grove School from the University of Santa Clara in 2007, Dr. Jorge Gonzalez, the NOAA-CREST Professor of Mechanical Engineering, has prioritized building collaborations between CCONY and research institutions throughout the Americas. He is drawing on the network of contacts that he has been building since he was chair of the Department of Mechanical Engineering at the University of Puerto Rico-Mayaguez, where he received his undergraduate degree.

His current international projects include investigating the anomalous expansion of Lake Enriquillo, an inland lake on the border of the Dominican Republic and Haiti. “Students are deploying sensors and studying regional climate change. They are also observing the strain on resource allocation which results when a natural phenomenon affects ten thousand families.” In Argentina, Dr. Gonzalez has established agreements with the National Technical University, the country’s space agency (CONAE), and the National Institute for Fisheries Research and Development (INIDEP). “At the University, we hope to elevate the training in remote sensing,” he says, “and at CONAE, our goal is to establish the applicability of tools developed at NOAA-CREST to studying polar weather and predicting ice formations in Antarctica. At INIDEP, we will help researchers become more mainstream users of remote sensing information.”

“These collaborations,” concludes Dr. Gonzalez, “create opportunities for our faculty, post-docs and students. We transfer what we know, but we also learn, and we are able to validate and improve the effectiveness of our research products. I look forward to more international partnerships as we engage further in global education and research.”

This year, Dr. Gonzalez’s wide-ranging expertise in climate change and energy issues has won him two important distinctions. He was elected a Fellow of ASME, where he has been active for the last 20 years, particularly in the Solar Energy Division, and is Chair of the Strategic Planning Committee’s Integrated/Sustainable Building Equipment and Systems Task Force. He has also been tapped by the US Department of Homeland Security to serve on its Sustainability and Efficiency Task Force. This is a select group of leaders from industry and academia. They are charged, Dr. Gonzalez explains, “with advising the Department on two types of challenges: how to make its facilities and operations more energy-sustainable and how to make its response capability more weather-ready.”

Dr. Gonzalez, who earned his doctorate at Georgia Tech, is also affiliated with the Program in Earth System Science & Environmental Engineering. His particular research interests are in solar energy, energy in building, heat island effect, and climate change modeling. He has attracted over \$10 million in sponsored research, most recently, a 2012 City SEED grant to investigate daylight reuse for improving energy efficiency in existing buildings.



IBM Provides Crucial Support for CCNY's International Thrust

As City College works to expand global opportunities for its students, it has found a committed partner in IBM. Senior Vice President and Director of IBM Research, Dr. John Kelly, shares CCNY's conviction that students in US colleges and universities should spend time in labs abroad, and he has made bringing students into IBM facilities a top priority. While many companies restrict such programs to the graduate level, Dr. Kelly is adamant that IBM include undergraduates. IBM's Global University Programs, which this year hosted six Grove School students, fall under the purview of the company's Vice President for Innovation & Global University Relations, Dr. Bernard Meyerson, who is himself a product of CCNY. He received his MS in Physics from the College and his PhD in Solid State Physics from CUNY. In 1992, Dr. Meyerson was designated an IBM Fellow, the company's highest technical honor, for his work in the development of silicon germanium technology.

During the summer of 2012, IBM welcomed six Grove School students to its facilities in Beijing and Zurich. JoAnn Winson, a Program Director on the Global University Programs team, explained that "when students enter the program, they become IBM employees for the summer, and we expect them to display a high degree of professionalism. The CCNY students rose to this challenge. In addition to performing well in the laboratories, they have mastered the issues of global etiquette, which are essential to working abroad." The summer research experience is completely funded by IBM, and students receive a generous salary.

IBM engages in a wide variety of research, and students are matched with labs according to their expertise and interests. In Beijing, computer science doctoral student Ning Xu developed his skills in simulation methods. Xiaochen Zhang, a doctoral student in electrical engineering, joined a team which modeled job execution in the cloud computing platform, Hadoop. And, Hang Li, who is completing a master's in civil engineering, participated in a project on pipe failure prediction. In Zurich, Greg Knoll engaged in setting up the infrastructure for a neural network, while his fellow computer engineering undergraduate, Ariel Teferici, joined a project on network optimization in distributed memory. Ivo Vigan, a PhD candidate in computer science, immersed himself in mathematical optimization.

“The CCNY students rose to the IBM challenge. In addition to performing well in the laboratories, they have mastered the issues of global etiquette, which are essential to working abroad.”

JoAnn Winson, IBM

The interns are grateful to have learned how research is conducted in industry and to have had the opportunity to work abroad. They deeply appreciate the warm welcome they found in the Zurich and Beijing labs and the easy interaction they had with senior researchers. Most importantly, they concur on the tremendous value of experiencing the discipline, goal-oriented approach, and teamwork that characterize the research environment at IBM.

Global E³ Opens New Worlds for Grove School Students

It is the dream of most college students to study abroad. Though programs abound in other disciplines, finding and funding similar opportunities has been a challenge in engineering. Engineering students have rigorous curricular requirements to fulfill, which can make it difficult for them to leave their home institutions. Now, as Dean Juan Carlos Mercado, Director of the CCNY Office of Study Abroad and International Programs explains, that is all changing. CCNY has become a member of the Global Engineering Education Exchange consortium (Global E³), opening a new world of international educational opportunities for Grove School students.

Since 1995, Global E³ has been addressing the growing demand for internationally-experienced engineering graduates. The program is administered by the Institute of International Education (IIE), a New York-based organization dedicated to developing the next generation of global leaders in the fields of science, technology, engineering, and mathematics (STEM). Global E³ brings together 26 international universities in Europe, Asia, Australia, Latin America and the Middle East plus 33 schools in the United States to which students from member institutions can transfer for a semester or the entire school year. While they pursue engineering studies abroad, they continue to pay tuition and earn credit at their home campuses. In some cases, they can take on supplemental internships, further enhancing their international experience. The result is a corps of young engineers who have begun to develop the foreign language ability, cross-cultural skills, and multinational experience essential to functioning successfully in the 21st century's globalized business and technical environment. “Thanks to this new CCNY affiliation,” says Dean Mercado, “Grove School students will be able to attend the best schools of engineering around the world. They will see how engineering is taught in other countries and develop contacts with their peers from other cultures.”



In Its Second Year, the Kaylie Competition Becomes an Integral Part of City College

In 2011, the first Kaylie Prize for Entrepreneurship led to a burst of creativity among CCNY engineering and science students, as they rose to the challenge of generating ideas and translating them into marketable products. Harvey Kaylie '60 EE (see page 4) had endowed the competition with a \$3 million gift. His purpose was to recreate an engineering business environment, so that students could “learn about the real world where there is success and failure.” Mr. Kaylie was so impressed with the outcome that, in 2012, he doubled the cash prize to \$50,000. His motivation, he explained, was to make “the competition a lot stronger and create more visibility and meaning to all of the students. I hope this additional reward can be a game changer in their lives, where they can see that the pursuit of excellence and creativity results in rewards.”

Dr. Daniel Steingart, Assistant Professor of Chemical Engineering, is the competition’s faculty supervisor. “Our five finalists were selected from an outstanding group of proposals, submitted by 25 student teams,” he said. “The things that will set the winners apart will be the clarity of the idea and the cleanliness of execution.” After four months of hard work, during which they developed prototypes of their products and business plans, the teams made presentations to a gala audience at CCNY, including a distinguished panel of judges from the world of entrepreneurship.

The winning team was VISTA (Vibro Tactile Intelligent System for Travelling Aid), made up of computer engineering seniors Daniel Zuleta, Frank Palmer, Cindy Rodriguez, and Javier Montesino, and psychology graduate student, Lei Ai. The team was advised by Professor of Computer Science Dr. Zhigang Zhu. They developed an aid for the visually impaired consisting of an athletic shirt fitted with ultrasonic sensors, which detects the distance of nearby obstacles, and vibrotactile units. These convey the information to the wearer with increasing vibrations as the object nears. In a further advance, the team demonstrated wireless “vibrotactile pods” worn as armbands or a harness.

Photo: Mr. Harvey Kaylie with winners of the second Kaylie Competition.

“I wanted to make the competition a lot stronger and create more visibility and meaning to all of the students. I hope this additional reward can be a game changer in their lives, where they can see that the pursuit of excellence and creativity results in rewards.”

Harvey Kaylie

Graduate students Elliot Schrock, Jeff LeBlanc, and Franqueli Mendez and undergraduates Johnny Huang and Crae Sosa of the team, “Julintani,” won the \$12,000 Dean’s Prize for their development of a cellphone microdonation app for alumni.

Both teams were awarded 24/7 summer access to the InnoLab, the new CCNY Physical Entrepreneurship Lab, sponsored by Irwin Zahn (ME ‘48). It is a Silicon-Valley-garage-like space where they will work to refine their inventions and bring them to market.

The three other finalists in the extraordinarily strong field were:

NExT UI, a suite of eye-tracking software and devices that allow a user to manipulate items on a computer screen without a mouse or keyboard. Members, Mohammod Arafat, John Ettikkalayil, Jaeseung Hahn, Ana Kodra; adviser, Dr. Lucas Parra, Professor of Biomedical Engineering.

Cor Vitalis, an artificial heart and pumping mechanism that does not destroy blood cells. Members, Nathali Bertran, Mike Cinelli, Nigel Gebodh, Samuel Kupfer, Sara Morsi; adviser, Dr. John Tarbell, Wallace Coulter Distinguished Professor of Biomedical Engineering.

Nanofils, a low-cost, long-lasting water filtration system that uses a novel nanoparticle to clear water of particulates, toxins, oils, and organisms. Members, Howie Chu, Francisco Guzman, Rahul Jayamohanlathika, Alex Skuratovsky, Muhammed Uzair; adviser Dr. Alex Couzis, Professor of Chemical Engineering.

The Aziz Ahmad Lecture Series: An International Entrepreneur Gives Back to the Grove School



“I came to City College as a foreign student with very few resources,” says Aziz Ahmad BEE '91, MEE '93. “To become an engineer, I had to find an affordable program. In fact, at CCNY, I benefited from one of the best engineering educations in the US, and at the time it was also one of its best kept secrets.”

City was the springboard for Mr. Ahmad's career in information technology and telecommunications. He joined AT&T, where he was the lead architect of the company's VoIP (Voice over Internet Protocol) networks. Building on that experience, he became a successful entrepreneur. He is now the President and CEO of UTC Associates, Inc., which he co-founded. UTC is a leading systems and network integration company and developer of software for information technology and telecommunications applications. He also founded Vonair, Inc., a

leading multimedia-based applications provider.

In 2003, Mr. Ahmad met Dr. Muhammad Yunus, the Nobel Peace Prize winner, who originated the concept of microfinance and founded the Grameen Bank. Mr. Ahmad, who, like Dr. Yunus, is from Bangladesh, was inspired by Dr. Yunus's book, “Banker to the Poor,” and the two formed a bond. Today, Mr. Ahmad is a board member of Grameen Solutions Ltd.; the name means Solutions for the Villages. The company, founded by Dr. Yunus, partners with industry leaders to create business, information and technology solutions that are innovative, affordable and sustainable.

“So many Grove School students start with nothing. I see similarities to myself at that age and feel a connection to them.”

Aziz Ahmad

Mr. Ahmad is the first recipient of CUNY's Asian-American Distinguished Alumni Award. His generosity to the Grove School of Engineering has earned him a place on the School's Wall of Honor. As part of his philanthropy, he has established the Aziz Ahmad Leadership Lecture Series at the Grove School to help cultivate entrepreneurship in engineering on campus. “So many Grove School students start with nothing,” he says. “I see similarities to myself at that age and feel a connection to them. Between studying and supporting themselves, they have very little time to develop a vision for the future. The lectures, delivered by leading executives, are designed to help them look ahead. The overall message is, ‘If I can make it to the top of industry, so can you.’”

Thanks to Mr. Ahmad's worldwide network of colleagues and friends, the series has already presented three distinguished speakers. Savio Chan, president and CEO of US China Partners Inc., which helps United States businesses expand into Chinese markets, inaugurated the series. He was followed by Joseph Laezza, president and CEO of Glowpoint, which provides cloud-managed video services, and Michael Millegan, president of Verizon Global Wholesale. “I hope that the lecture series will inspire successful alumni to get involved,” says Mr. Ahmad. “I would like them to come back to CCNY while they are still in the fray, so that they can communicate to students the dynamic role which engineering plays in the economy.”

CUNY Helps Create Silicon Valley-Type Start-Ups in New York State

Increasingly, CUNY is serving as an engine for the development of high tech companies in New York. By fostering technology transfer projects and translating cutting edge research into commercially viable products, it is helping create vibrant new companies and high-quality jobs.

Dr. David Crouse, Associate Professor of Electrical Engineering at the Grove School, is at the forefront of this effort. He is director of the CUNY Center for Advanced Technology in Photonics Applications (CUNY CAT), which promotes collaboration between the University and the corporate community in applied photonics research, with important ramifications for the medical, biological, industrial, and military sectors. Dr. Crouse, who holds a PhD from Cornell, is himself an entrepreneur, who co-founded Phoebus Optoelectronics. Phoebus has attracted over \$6 million in funding, leading to a growing number of patents stemming from Dr. Crouse's breakthrough work in photonics and metamaterials.

CUNY CAT leverages funds from New York State's Department of Economic Development, Division of Science, Technology, and Innovation (NYSTAR) and CUNY to promote faculty entrepreneurship and serve as a resource for the private sector. It helps CUNY faculty commercialize their innovations through financial support and guidance in bringing research to the marketplace. With Baruch College's Lawrence N. Field Center for Entrepreneurship, CUNY CAT has developed seminars targeted towards starting technology companies, leading participants to secure Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants. For qualifying private sector projects, CAT offers access to the resources of a major research university. These include laboratories with sophisticated instrumentation and high performance computing facilities, the expertise of senior faculty researchers and highly qualified support staff, as well as supplementary funding.

In 2011, CUNY CAT received the nod to establish a Center for Metamaterials under the National Science Foundation's Industry and University Cooperative Research Center program (I/UCRC). Dr. Crouse, who directs the new center, says that it will "provide a one-stop shop for the design, fabrication and testing of a wide range of metamaterials." Dr. Crouse explains that "metamaterials have optical and acoustical capabilities beyond normal materials." These include cloaking devices that allow light to wrap around an object, creating the perception of invisibility, and numerous other examples in renewable energy and sensors.

The Center brings CUNY together with three other universities and 15 corporations. It will conduct fundamental research on issues that are limiting the application and implementation of metamaterials to commercial products. It will work closely with CUNY CAT and similar programs at the three other universities. "We want the Center for Metamaterials to be a feeder for concepts and projects that graduate into more applied development with our CAT program and the other organizations, eventually leading to commercialization and economic impact," Crouse said.



The NSF I/UCRC grant will run for five years. During the initial year, the NSF is expected to provide \$230,000, with an additional \$40,000 coming from each of the participating corporations.

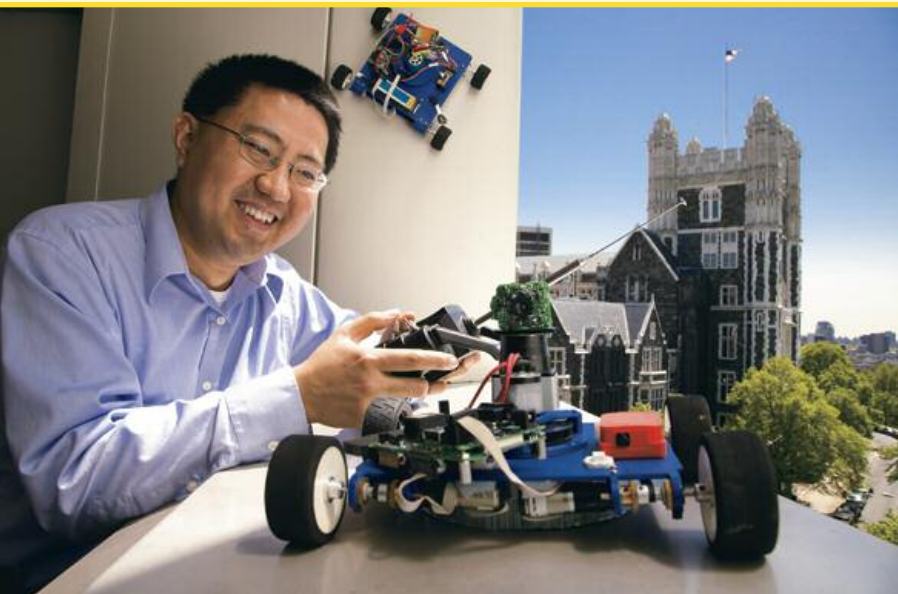
A Researcher with an Entrepreneurial Mind: Dr. Jizhong Xiao Prepares to Commercialize City Climber

In 2006, Dr. Jizhong Xiao, Associate Professor of Electrical Engineering at the Grove School, introduced a video “City Climber at Work” at the IEEE International Conference on Robotics and Automation (ICRA2006), where it was selected as a finalist for best video award. The City Climber, he explained, was “a new generation of wall-climbing robots, which has the capabilities to climb walls, walk on ceilings, and transit between different surfaces. Unlike traditional wall-climbing robots, the City Climber robots use aerodynamic attraction, which achieves good balance between strong adhesion force and high mobility. Since they don’t require perfect sealing as the vacuum suction technique does, the robots can move on virtually any kind of smooth or rough surfaces.”

Next came an NSF CAREER award, under which Dr. Xiao developed a general framework and theoretical foundation to address planning, control and coordination issues pertaining to robots that can operate in the three-dimensional environment. He focused on getting multiple mobile units to operate in concert, especially in constrained, urban environments.

Now, City Climber is on the way to commercialization. Dr. Xiao received a \$50,000 grant from the NSF Innovation Corps (I-Corps) program, which, he explains, “chooses the most promising technology that can transfer from lab to market. It reprograms the researcher into an entrepreneur and helps the transition of laboratory innovation to the market to create jobs.” With Brooklyn College computer science graduate student Micky Muldoon and Dr. John A. Blaho, of the CUNY Center for Advanced Technology, who is the project’s industrial mentor, Dr. Xiao took part in a Stanford University program in which he learned the basics of entrepreneurship.

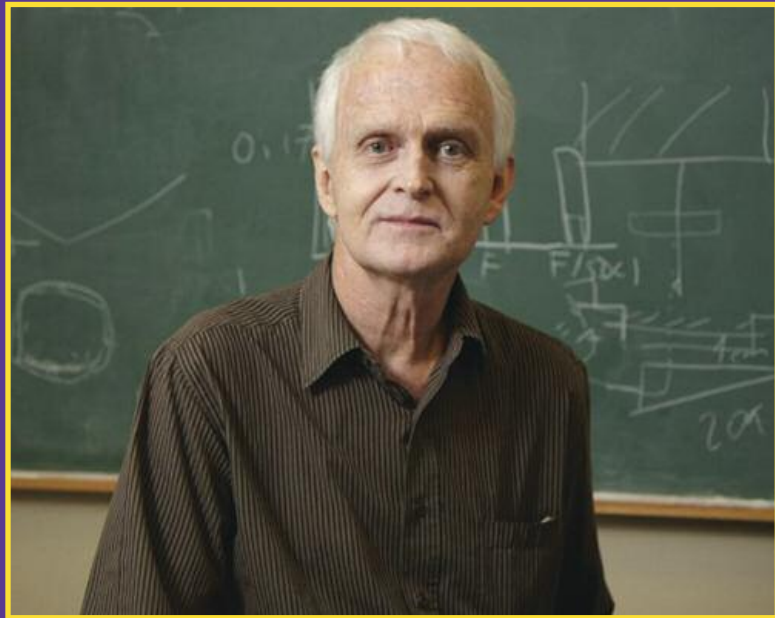
“Lectures and webinars taught us how to construct a business model canvas,” he says. “However, the most valuable part of the program was called ‘Get Out of the Building.’ This entailed contacting over 100 potential partners, customers and even competitors to test our business model’s validity.” The process showed Dr. Xiao that the market for the City Climber was in non-destructive testing of large flat surfaces such as building facades, dams and cooling towers. He also realized that customers wanted an impact echo testing function added to the robot’s visual capabilities. He now has two provisional purchase orders from an inspection company in New York. In addition, he and Dr. Anil Agrawal of Civil Engineering have an \$80,000 grant from the US Department of Transportation to use City Climber for bridge inspection.



Dr. Xiao, who came to the Grove School in 2002, single-handedly started the CCNY robotics research program. He is the founding director of the CCNY Robotics Lab and of the Center for Perceptual Robotics, Intelligent Sensors and Machines (PRISM). His research has inspired countless undergraduate and graduate students and has made robotics one of the most exciting fields at the Grove School.

“We have a brilliant, stable team and the resources for faculty to develop their research ideas.”

Dr. John Tarbell



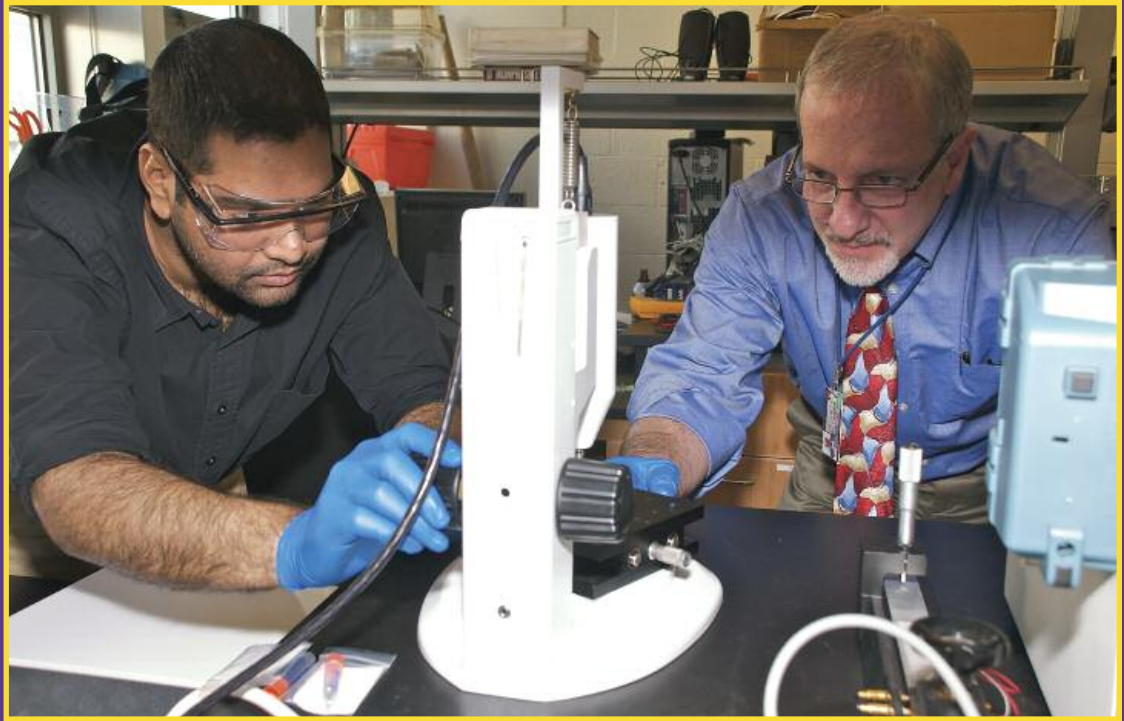
At Biomedical Engineering, a String of Successes

It is hard to imagine the Grove School without its thriving Biomedical Engineering Department, and yet it was established a mere decade ago. “We have a brilliant, stable team,” says Department Chair, Distinguished Professor John Tarbell. “The Department is built around four research areas, Cardiovascular Engineering, Neural Engineering, Musculoskeletal Biomechanics, and Nanotechnology & Biomaterials. So every faculty member has colleagues to collaborate with, and through the New York Center for Biomedical Engineering (NYCBE), they have research opportunities at New York’s leading hospitals.” Another key to the Department’s success is its solid funding. “Thanks to the Whitaker and Coulter Foundations, we have excellent facilities for young faculty,” says Dr. Tarbell. “Add to that NIH support through SCORE, R01 and R21 grants, and we have the resources for faculty to develop their research ideas in order to attract funds from other granting agencies.

The excellence of the BME department is evident. Its young faculty members have won three NSF CAREER awards and two Coulter Early Career Translational awards. Its senior faculty includes six members of the American Institute for Medical and Biomedical Engineering, four CUNY Distinguished Professors, and, in Drs. Sheldon Weinbaum and Stephen Cowin, two members of National Academies.

This year, the Department has received two important honors: the NAMEPA 2012 Outstanding Collegiate Retention Award and impressive National Research Council (NRC) rankings for its PhD program.

NAMEPA (The National Association of Multicultural Engineering Program Advocates) connects corporate America to technical colleges and universities. Over the past 30 years, it has contributed to tripling the number of engineers of color in a field that has traditionally lacked diversity. In 2012, the NIH Scholars Program for Undergraduate Training of Underrepresented Minorities in Biomedical Engineering at CCNY received the organization’s coveted Outstanding Collegiate Retention Award.



Since 2001, the NIH Scholars Program has brought \$10 million into the Department. This has supported intensive mentoring of undergraduates by PhD students. It has provided full scholarships and generous stipends, allowing these students to focus on their studies. One of the program's pillars is research experience, starting in the junior year, and including at least one summer research internship. The upshot has been retention of over 94% since 2007. In addition, 60% of participants plan to pursue PhD or MD degrees.

The Scholars Program's ethos of success through mentoring and research is in complete synch with the Department's philosophy. Dean Joseph Barba attributes the Department's success to a "trickle-down" model of mentoring which begins with departmental leadership and flows through senior and junior faculty to graduate and undergraduate students. Dr. Tarbell points out that from its beginning the Department has shared the NAMEPA mission of promoting diversity in engineering. "Half of our faculty members are women or come from minority groups," he says. "This creates a comfort zone which allows us to attract a diverse student body."

The excellence of the BME faculty, its devotion to mentoring, the Department's solid funding, and the NYCBE network have also born fruit at the doctoral level. The PhD program in Biomedical Engineering, which began at CUNY in 1999, currently serves 40 students and has already produced 30 PhDs. This year, it was recognized as one of the best in the country. In the 2012 NRC rankings, it is tied with The Johns Hopkins University and University of Pennsylvania in 11th place out of 74 programs across the nation. According to Dr. Tarbell, "the NRC rankings are generally considered the gold standard of national ranking systems. They take into account detailed quantitative measures of faculty productivity, student achievement, financial support for students, peer recognition, diversity and many other criteria." In addition to its impressive overall score, the CCNY program ranked seventh on research productivity and first for diversity.

BME's Associate Professor Luis Cardoso Landa Is Named CCNY's Outstanding Teacher

In 2004, BME's Distinguished Professor Stephen Cowin heard Dr. Luis Cardoso, then a post-doc at Mount Sinai School of Medicine, deliver a lecture at the CUNY Graduate Center, and immediately encouraged him to apply for a position in CCNY's new BME program. Since coming to the Grove School seven years ago, Luis Cardoso has been one of BME's greatest assets. He is a brilliant and prolific researcher, a curricular innovator, and an outstanding teacher.

Dr. Cardoso's research focuses on bone, cartilage, and vascular biomechanics. In particular, he studies bone loss and osteoporosis, using microCT imaging and ultrasound wave propagation in porous media. He is responsible for establishing CCNY's multi-scale and functional imaging laboratory, which combines biomechanics, ultrasound imaging, signal processing, and micro computed tomography. Dr. Cardoso has 30 peer reviewed journal papers to his credit, as well as another 82 articles or contributed presentations (including peer reviewed conference proceedings), and two patents pending. His curricular work includes developing BME's courses in Dynamical Systems and Bio-electrical Circuits, as well as its Senior and Junior Design offerings. He serves as Chair of the BME undergraduate curriculum committee.

A groundswell of admiration from his students resulted in his receiving the 2012 Outstanding Teacher Award, one of CCNY's most important honors. "The group of seniors who have nominated Prof. Cardoso for this award is the strongest since we started the BME undergraduate program. That the students took the initiative to nominate Luis is really the ultimate compliment," says his colleague Dr. Susannah Fritton. In letter after letter, students praised Dr. Cardoso's patience, helpfulness, and "openness to answer any basic question." In the words of one senior, "His explanations about any topic are crystal clear, descriptive, and interesting." Another commented on "his dedication and commitment to make us into good engineers," and yet another on his willingness to go more than the extra mile. "Senior Design," the student explained, "requires the melding together of many previous classes as well as learning new material. Dr. Cardoso spent countless hours helping team members grasp the basic concepts of digital electronics (which was not covered in any of our courses) so that we could apply these concepts to our projects."

Dr. Cardoso credits his parents, both teachers, with inspiring his professional ethic. "I try to put myself in the place of the students," he says. "I feel responsible for their success, and I try to lead by example." He also comments on the supportive nature of the BME department. "It is a huge help to be surrounded by colleagues who excel at teaching and research," he adds.

Dr. Cardoso holds a BS from the National Polytechnic Institute in his native Mexico and an MSc and PhD from Paris XII University in France. "My background is Hispanic," he says. "I try to show students from minority backgrounds that if you are in the right place with the right people and you work hard, there is no reason why you cannot succeed." He is devoted to CCNY's mission of diversity, and in 2007 joined BME's Distinguished Professor Sheldon Weinbaum as Co-PI of the National Urban Model for Minority Biomedical Engineering Education program, funded by the NIH.



Associate Professor Marom Bikson of BME wins CCNY Mentoring Award in Architecture, Biomedical Education, Engineering and Science



“My philosophy of mentorship is that success is measured by the future professional accomplishments of mentees,” says Dr. Marom Bikson. “It is critical that each student’s experience be tailored to their own aptitude and hopes. The emphasis on structuring each student’s experience is reflected in the diversity of career paths my mentees have taken.” And indeed, Dr. Bikson’s mentees have so excelled in academia, industry, and government that BME Department Chair, Distinguished Professor John Tarbell, has described Dr. Bikson as a “factory for successful graduates.”

The two students who nominated Dr. Bikson for the mentoring award exemplify this exceptional level of achievement. Dr. Tarbell describes Je Hi An as “one of the most successful undergraduate researchers in the history of our department.” She is now a PhD candidate in biomedical engineering at Duke, supported by the prestigious NSF Graduate Research Fellowship. Of Dr. Bikson, she says, “He is an extremely gifted mentor who can transform ordinary students into young prospering scientists.” Je Hi credits Dr. Bikson with fostering her stellar undergraduate career through his academic advice and his sensitivity to the demands that her lengthy commute and time spent working to support her family placed on her.

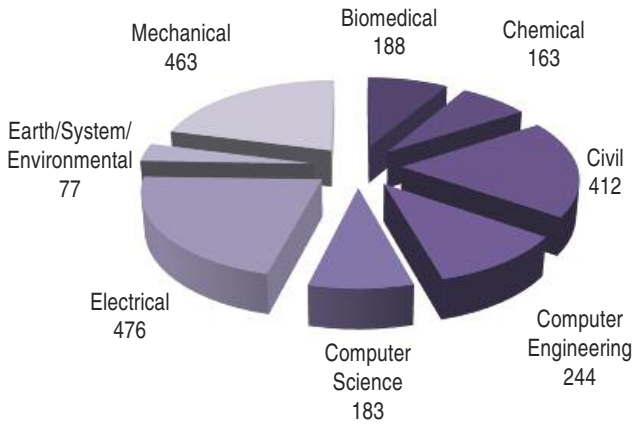
Johnson Ho, the 2012 CCNY Valedictorian, is Dr. Bikson’s second mentee to be honored with a Goldwater Scholarship. In Dr. Bikson’s lab, Johnson designed, published and patented a new electrotherapy medical device, which is already in investigational use at major medical centers including Harvard Medical School and the NIH. According

to Johnson, Dr. Bikson “taught me both the challenges and rewards of translational research driven by a keen appreciation of the clinical need, and cemented my resolve to do basic neuroscience research and advance therapeutic brain stimulation technologies.”

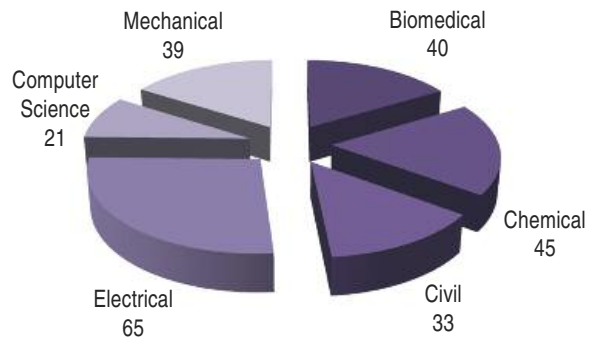
Dr. Bikson’s own excellence as a researcher is a major source of inspiration to his students. A graduate of Johns Hopkins with a PhD from Case Western Reserve, he came to the Grove School in 2003 and is now co-director of Neural Engineering at CCNY and the New York Center for Biomedical Engineering. His basic research aims to understand normal and diseased brain function by applying engineering analysis to the most challenging problems in brain research. His translational research studies the effects of electricity on the human body and applies this knowledge toward the development of medical devices and electrical safety guidelines. He is a recipient of the Wallace H. Coulter Translational Research Award. His work is also supported by the NIH, the Andrew Grove Foundation, and the Howard Hughes Medical Institute.

Dr. Bikson is a leader in the Grove School’s growing emphasis on leveraging the cutting-edge research of its faculty into successful entrepreneurial ventures. He is the founder and CEO of Soterix Medical Inc. The company produces tDCS stimulators and accessories. tDCS is an investigational technique in which sustained direct current is used to modulate brain function. Its clinical applications are growing rapidly. Trials of Soterix tDCS systems are currently being conducted at Harvard Medical School and other prestigious institutions to determine their efficacy in treating pediatric epilepsy, depression, stroke aphasia, and fibromyalgia.

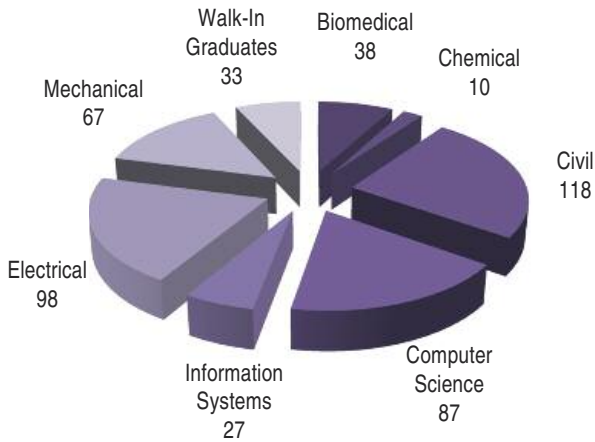
Undergraduate Enrollment Fall 2011
Total: 2206



PhD Enrollment Fall 2011
Total: 243



Master's Enrollment Fall 2011
Total: 478



Degrees Granted 2011-2012		
Bachelor's degrees	Master's degrees	PhD degrees
251	128	30

Tuition and Fee Schedule, Fall 2011	New York City & State Residents	Out-of-State Residents*
Undergraduate Full-time Part-time	\$2,565 per semester \$215 per credit	\$460 per credit \$460 per credit
Master's Full-time Part-time	\$4,810 per semester \$405 per credit	\$710 per credit \$710 per credit
Doctoral Level 1 Full-time Part-time	\$3,670 per semester \$415 per credit	\$715 per credit \$715 per credit
Doctoral Level 2 FT/PT	\$2,300 per semester	\$5,110 per semester
Doctoral Level 3 FT/PT	\$910 per semester	\$1,820 per semester

*Includes international students who have lived in New York State for less than one year



Christopher Hue '08



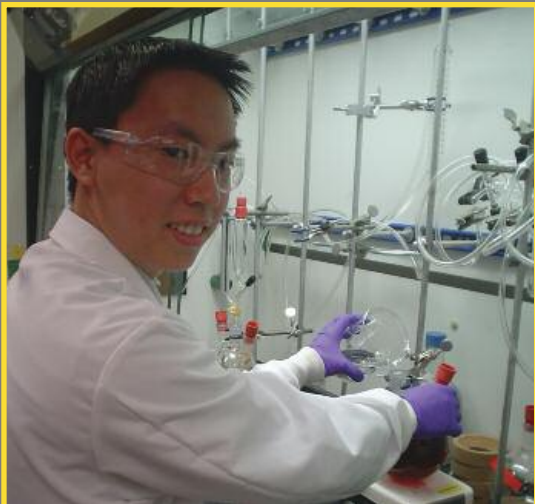
Charlie Corredor '09

Grove School Students Honored with National Science Foundation Graduate Research Fellowships

In 2012, CUNY set a record for public universities in the Northeast, when 16 of its students received the coveted National Science Foundation Graduate Research Fellowship. The award will provide them with over three years of support worth up to \$121,500 as they pursue advanced, research-based study in computer and information science, engineering, life sciences, and the physical, behavioral and certain social sciences. Four of the students are from the Grove School, with the Departments of Biomedical Engineering and Chemical Engineering splitting the honors. Now, these brilliant young alumni are succeeding in graduate careers at some of the nation's most prestigious universities.

In Columbia University's Neurotrauma & Repair Laboratory, Christopher Hue '08 is continuing work in biomedical engineering in which he excelled at City. His PhD research investigates the effects of blast-induced traumatic brain injury on the blood-brain barrier, a project of great relevance in the context of today's battlefield injuries. Christopher credits the mentoring of Drs. Marom Bikson and Luis Cardoso and his experience in the BME Senior and Junior Design Projects with being the best possible preparation for the challenging environment at Columbia. And, he says, "The CCNY engineering curriculum was very rigorous. Support from my Honors advisors, Lee Linde and Robin Villa, was essential to my success." His GSOE education included collaborative work with surgeons at Memorial Sloan-Kettering Cancer Center. And, thanks to the Grove School alumni network, he spent two years working at Merck & Co., Inc. prior to starting at Columbia.

"CCNY is my home. I would not be where I am today without Drs. Ilona Kretzschmar, Claude Brathwaite, and John R. Lombardi. The best way I can thank them is to excel," says Charlie Corredor '09. As a chemical engineering undergraduate, Charlie did research at CUNY's prestigious Energy Institute and its Center for Analysis of Structures and Interfaces (CASI). He also served as an undergraduate research assistant in leading laboratories in France, Sweden, and China. After a year in the Micro/Nano Fluidic Laboratory at Arizona State University in Tempe, where he became a predoctoral Ford Foundation



Stephen Ma '11



Jaeseung Hahn '12

Fellow, he followed his advisor to the University of Washington in Seattle. Charlie's doctoral work involves applications of micro and nano scale transport physics at the interface of chemistry, materials, and biology. He is studying nanotoxicity, i.e., how engineered nanomaterials can cause disruption of, and passive transport through, simplified models of artificial cell membranes.

Stephen Ma '11 is a doctoral student in chemical engineering at the University of Delaware, where he is currently designing better pressure sensitive adhesives (PSAs), using covalent adaptable networks (CANs). PSAs stick to a surface with the application of pressure and are used in products such as sticky notes and paint tape. Stephen credits his work with Drs. John R. Lombardi, Ilona Kretzschmar, and Raymond Tu with preparing him for a rigorous graduate experience. "My research at City gave me excellent techniques, and taught me how pick up new material quickly," he says, "and the summer research I did in China, thanks to Dr. Lombardi, developed the skills which I am using in my doctoral project." He points out that his City professors encouraged him to be independent and to explore new ideas, making him confident in his transition to graduate school.

Jaeseung Hahn '12 is pursuing his doctorate in Harvard and MIT's joint program in medical engineering and medical physics. His goal is to develop a new type of branched gold nanoparticle for use in cancer detection and treatment. Jaeseung started research as a freshman with the encouragement of Dr. Yuying Gosser. He began his work on gold nanoparticles as a summer research intern in Germany, and continued it at Memorial Sloan-Kettering Cancer Center and in the Grove School lab of Dr. Sihong Wang. Jaeseung served as president of the CCNY Entrepreneurship Club, and he was a finalist in the 2012 Kaylie Competition, which, he says, "taught me about real life aspects of engineering and science." His team developed NExT UI (Natural Technology User Interface), a suite of eye-tracking software and devices, which allow the user to manipulate items on a computer screen without a mouse or keyboard.



Joseph Badami
Chemical Engineering

“My mentor, Dr. Raymond Tu, allows the most extreme independence in graduate work while providing excellent guidance.”

Joseph Badami is a native New Yorker with a City College legacy: two aunts and an uncle are CCNY graduates. So, when Joe arrived at City following his BS in chemical engineering at the University of Rhode Island, it was a homecoming. His first conversation with Dr. Raymond Tu had made it easy to choose City for his graduate work. “Dr. Tu,” he says, “is incredibly open and wants students to come up with their own projects.” Joe’s field is biomolecular engineering. His research is in interfacial science. How molecules assemble themselves as interfaces has important ramifications for the design and engineering of microbubble constructs for ultrasound molecular imaging and targeted drug delivery. Thanks to Dr. Tu’s wide network of colleagues, Joe is working on those issues under Dr. Mark Borden of Columbia University, a leader in the field.



Mohammed Benalla
Biomedical Engineering

“I was drawn to biomedical engineering because of its capacity to improve the medical field.”

Mohammed Benalla came to City with a BS in physics and a master’s in electro-mechanics from his native Morocco. He did his master’s research in biomedical engineering at City under Dr. Stephen Cowin. Now, for his doctoral research, he is working with Dr. Cowin and Dr. Luis Cardoso on interstitial fluid flow, the main origin of the mechanotransduction mechanism in bone. “Understanding bone mechanotransduction is fundamental to the understanding of how to treat osteoporosis, how to cope with microgravity in long-term manned spaceflight and how to design prostheses that are implanted in bone tissue to function for longer periods,” he says. In particular, his work concerns the determination of the lacunar-canalicular permeability of bone using cyclic loading, and he has four papers to his credit. During much of his time at CCNY, Mohammed has been an adjunct professor at Citytech, teaching Fluid Power, Engineering Design, Statics, and Strength of Materials. He plans to stay in academia.



22 Samleo Lev'n Joseph
Electrical Engineering

“My motto is: “Augment our bodies with sophisticated technologies from robotics to power the mobility of the human race.”

Doctoral student Samleo Joseph is living his motto. His research interests are in SLAM (Simultaneous Localization and Mapping), 3D modeling and 3D vision. Since 2008, he has been pursuing them as part of a group of professors and students, led by Drs. Jizhong Xiao and Ying-Li Tian of Electrical Engineering, who are perfecting a system to help visually challenged and blind people navigate interior and outdoor spaces. The system combines the latest innovations in robotics and computer vision. According to Samleo, “The conventional products which help the blind are expensive, inaccurate and uncomfortable.” The CCNY system remedies that through small, lightweight components worn on the head, waist, and wrist. Using the SLAM technology, it generates a map of an unknown environment and “speaks” the location scenarios. Samleo is leading a team of students from a variety of engineering majors who are engaged in developing the software algorithms and the hardware, which includes audio and tactile feedback.

“Now that I have come to New York, I feel that I can go anywhere. My experience at City has given me the confidence to tackle any challenge.”

Lauren Patrin was determined to come to New York for graduate school, and at City, she found the perfect fit. It is a project to develop lighter-weight armor for military vehicles, headed by Dr. Feridun Delale, under a large Department of Defense grant. “The more I got into the research, the more I got into composites,” says Lauren. “Making structures lighter while maintaining their strength has huge implications for commercial vehicles. It can make them more affordable and cut down on fuel consumption.” At City, Lauren has found superb mentoring. “Dr. Delale really cares about his students. Under his guidance, I have already published two papers,” she says. After her doctorate, Lauren is headed for the transportation industry, where she plans to use her knowledge of composites in the manufacturing of planes, trains or cars.



**Lauren Patrin
Mechanical Engineering**

“Computer security has changed the way we interact with each other in this global village.”

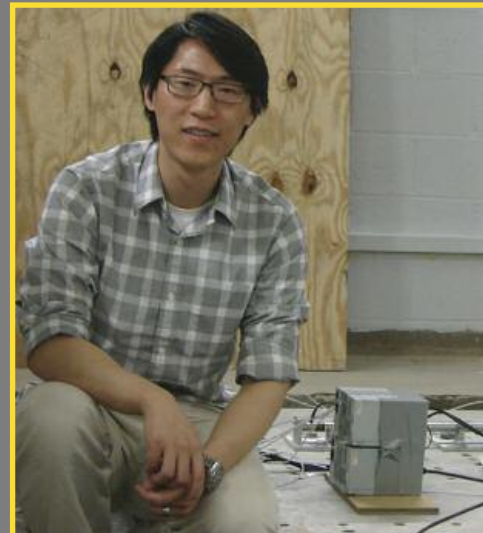
Milinda Perrera became interested in cryptography as a CCNY undergraduate. Now, he is doing doctoral research with Dr. Nelly Fazio in the area of Anonymous Broadcast Encryption. In addition to preserving the privacy of message content, this also preserves the anonymity of the receiver. In a paper presented at PKC 2012, the 15th IACR International Conference on Practice and Theory of Public-Key Cryptography in Darmstadt, Germany, Milinda and Dr. Fazio proposed the first broadcast encryption scheme with sublinear ciphertexts to attain meaningful guarantees of receiver anonymity. Next, Milinda hopes to move into steganography, which makes the encrypted message invisible to anyone but the sender and the receiver, who remain anonymous. “We are coming up with sophisticated tools for secret communication,” he says, “but society must use them wisely. That should always be on our minds.”



**Irripuge Milinda Perera
Computer Science**

“At City, I have met a very international group of students and worked with researchers from other universities.”

Jianqiu Zhang came to CCNY with a master’s in mechanical engineering from the University of Science and Technology of China and experience in the Chinese automobile and machine tools industries. His doctoral work, under Dr. Anil Agrawal, has entailed smart damping technology, including modeling and analysis of structures using simulation tools to investigate the behavior of buildings under external excitations such as earthquake and wind; testing steel structures under actuator force excitations; and experimental experience of vibration and damage control of structures using dampers. One project brought together researchers from CCNY, Lehigh, Purdue, UConn and the University of Illinois Urbana-Champaign to test the use of dampers to promote optimal control of structural responses in earthquake zones using a full-sized three-story prototype constructed at Lehigh.



**Jianqiu Zhang
Structural Engineering**

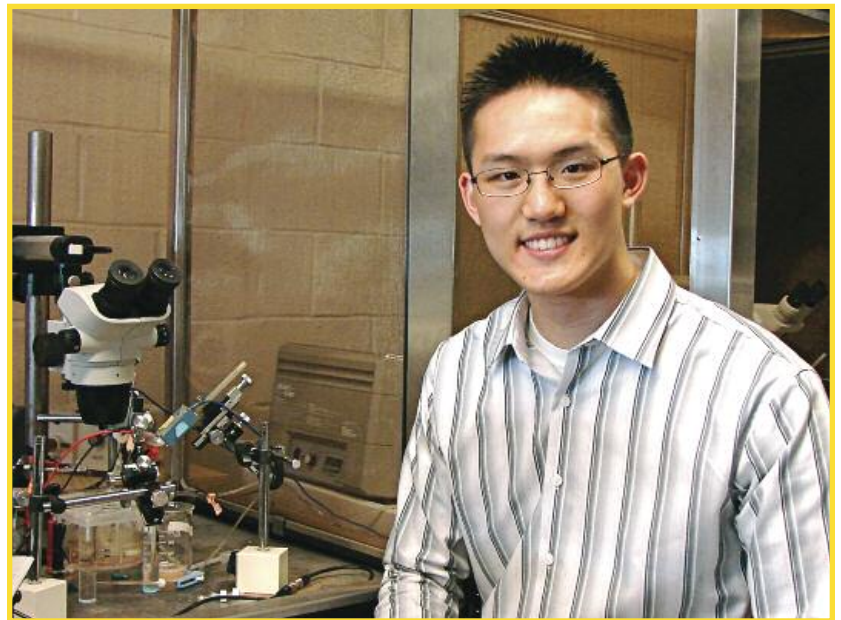
Johnson Shiuan-Jiun Ho of Biomedical Engineering is 2012 Grove School Valedictorian

Johnson Ho ended his Grove School career with a Valedictorian address entitled "Finish Well." In fact, he finished as he had begun, not just well but brilliantly. Johnson plunged into life at CCNY and excelled in every endeavor, culminating in a nationally prestigious Barry M. Goldwater Scholarship his junior year and his later selection as Valedictorian. In addition to an exceptional academic record and his enrollment in the Macaulay Honors College, Johnson found time for sports, serving as Lieutenant Crew Chief of the CCNY Volunteer Emergency Squad, and mentoring. "Johnson is the 'uber' peer mentor on campus," says his advisor, BME Associate Professor Marom Bikson. "Through the City Honors Mentoring Program, he has encouraged many undergraduate students to engage in research, internships, and campus activities beyond the classroom. Not only does Johnson personify success at CCNY, he has worked hard to generate success in our other students." Johnson's parents are his model for altruism. They are Taiwanese immigrants who gave up promising careers in business and academia to pursue theological studies and church ministry, making it their life mission to minister to and serve the Asian immigrant community of Flushing, New York.

Beginning in his first semester at CCNY, Johnson pursued undergraduate research in Dr. Bikson's Neural Engineering Laboratory. His achievements include the design of a new electrode technology for non-invasive electrotherapy, which has been published and patented and is in investigational use at major clinical centers. "Through expanding use and clinical validation, Johnson's medical component design may become a standard accessory in some aspects of modern electrotherapy practice used in the treatment of neuropsychiatric disorders including neuropathic pain," says Dr. Bikson. BME Department Chair Dr. John Tarbell terms this achievement "simply exceptional."

Soon after graduation, Johnson left for the National Taiwan University College of Medicine, where he studied fundamental mouse electrophysiology, neuronal morphology, and behavioral characterization techniques, and developed protocols to test a newly developed artificial eye device using basic mouse retina dissection and electrophysiological patch-clamp methodologies. He then went to Egypt to learn Egyptian Arabic. In mid-August, Johnson entered the MD/PhD program at SUNY Downstate Medical Center College of Medicine, where he is pursuing his interest in Neural and Behavioral Science. "I consider Johnson's most unique trait

his passion for applying engineering to solve medical problems, with the very specific goal of healing. Johnson is not just a gifted biomedical engineering student; he is humanitarian to the core," says Dr. Bikson. Wherever life takes him, Johnson Ho will be a credit to the Department of Biomedical Engineering, the Grove School, and CCNY.



“I plan to work on changing the way we implement technology and infrastructure to help merge the human environment and the natural environment in a more sustainable manner.”

Adam Atia is a young scientist out to see the world. Since coming to City he has participated in the Trans-Atlantic Aerosol & Ocean Science Expedition (AEROSE-V), in which he traveled across the Atlantic Ocean aboard a NOAA vessel to characterize the evolution of trans-Atlantic Saharan dust aerosols. Under the auspices of the DAAD German Academic Exchange Service, he has done research at the Leibniz Institute of Marine Sciences at the University of Kiel, in Germany, performing trace metal analysis to estimate residence times of dissolved aluminum concentrations in sea water after desert dust deposition. And most recently, for his capstone design project, he has engaged in the design, planning, and deployment of a hydro-climatic sensor network transecting the Neyba mountain range, north of Lake Enriquillo in the Dominican Republic. “The purpose,” Adam explains, “was to conduct a water balance assessment on the watershed to gain a better understanding of the anomalous expansion of Lake Enriquillo.”

“Our Grove School community is amazing. We work in teams, we look out for each other, and we learn from each other.”

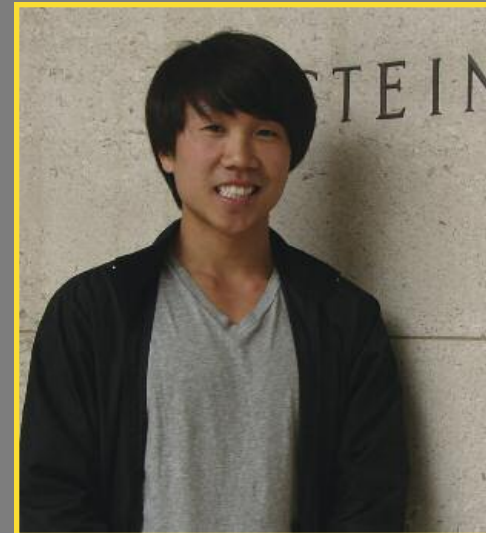
“In my research, volunteer, and work experiences,” says Michael Cheng, “I always choose the most hands-on approach.” Those experiences have been many and varied. Michael has done research in the Physics Department at Brooklyn College, at the Dartmouth College Center for Nanomaterials Research, and in the Grove School Chemical Engineering Department, where his three-year project focused on enhancing current distribution uniformity in electrochemical systems. During an internship at General Electric Transportation, he worked on the development of Tier 3 and Tier 4 locomotives. This confirmed his desire to go into industry. “I enjoyed being involved in innovative projects which yielded practical results,” he says. Michael established the first chapter of the American Society of Engineering Education on campus, and gained teaching experience by leading engineering workshops for summer campers in the Thayer School of Engineering Science Program. Under Macaulay Honors College auspices, he spent a semester studying in Barcelona, Spain. “Living in a foreign country and speaking another language was the best experience of my life,” he says.

“Once I have graduated from CCNY, I hope to help rebuild our American manufacturing industry through the design and engineering of products with cutting edge innovation and creative design.”

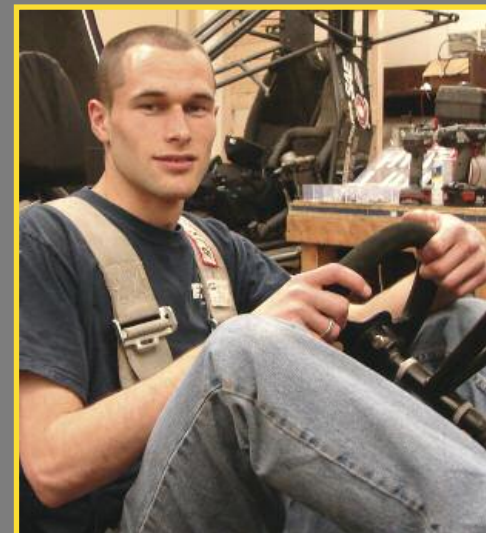
Glen Kleinsasser graduated from high school as a certified machinist. “If you are going to design things,” he says, “you have to know how things work and are made.” With his passion for building things, engineering was his obvious path. For the past two years, Glen has led the Society of Automotive Engineers chapter on campus, determined to improve CCNY results in major competitions. In the 2011 Supermileage Competition, the CCNY team placed 5th in design out of 32 engineering schools. Next, came the 2012 SAE Baja Competition in Alabama. “Although we have a small and relatively inexperienced team,” he said, “we have come up with a very innovative design that will hopefully translate into a much higher placement than past CCNY vehicles.” And it did: the team finished 21st overall out of 100 teams, up from 50th the last time CCNY competed, and 18th in the main endurance event.



Adam Atia
Environmental Engineering and
Earth System Science



Michael Cheng
Electrical Engineering



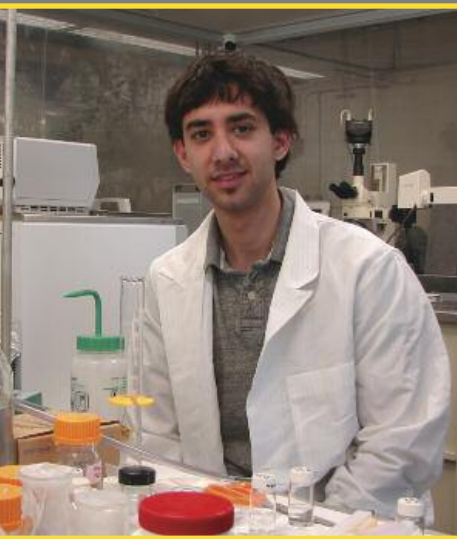
Glen Kleinsasser
Mechanical Engineering



Brigitte Liu
Computer Science

“City has opened my eyes to the world of opportunities for women in engineering.”

There are not enough women in computer science, and that is something that Brigitte Liu is bent on changing. Her long-term goal is to work in homeland security. She has been preparing herself by mastering the intricacies of cryptography, computer graphics, image processing, and database systems. Brigitte took part in the prestigious NSF REU MERIT Biosystems Internships for Engineers program at the University of Maryland. There, she implemented a biometrics recognition/verification system using face as modality and analyzed the performance of different security methods ranging from cryptography to signal processing, based on communication bandwidths, runtime, and matching accuracy. With her eye on homeland security, Brigitte has developed a working knowledge of five foreign languages which are critical to the Department of Defense. A dedicated mentor, she served as president of the Honors Students Activities Council at City, where she made it her mission to recruit incoming Honors Program students to major in computer science and engineering.



Arash Nowbahar
Chemical Engineering

“City College was a very helpful, supportive environment where all my professors knew me.”

Arash Nowbahar is a chemical engineer with a 4.0 average, who likes his research to be “math intensive.” He is heading to UC Santa Barbara for his PhD, where he plans to do fundamental research in complex fluids and transport phenomena. At City, he acquired a broad ChE background and did research with Dr. Raymond Tu, in which he characterized and controlled fractal structures with applications in electronics. He also studied with Dr. Jeffrey Morris of the Levich Institute, the principal investigator of NSF PREM (Partnership for Research and Education in Materials) at CCNY, a collaboration with the University of Chicago MRSEC (Materials Research Science & Engineering Center). Under PREM auspices, Arash spent a summer in Chicago, analyzing the propagation of elastic-flexural vibrations on an ice shelf containing a random distribution of crevasses. Arash has also been an explainer at the New York Hall of Science. This convinced him that he would like to combine teaching with his research career.



Cynthia Wang
Civil Engineering

“I love civil engineering because any building needs a structure – a skeleton. It is the basis of shelter, which we all need in our lives.”

Cynthia Wang came to City from the prestigious New Explorations into Science, Technology and Math High School in Lower Manhattan. There, she participated in the ACE (Architecture, Construction and Engineering) Mentor program, run by the construction industry to expose students to real-world opportunities. Working with mentors from construction companies, she and her team mates designed a resort for Brooklyn’s DUMBO neighborhood. “It is great,” she says “to build something with a team and see how far you can push yourself.” For the past two years, Cynthia has been president of the GSOE’s Concrete Canoe Club. In 2011, under her leadership, the Grove School placed first in the ASCE Metropolitan Region Concrete Canoe Competition. A member of the CCNY Honors Program, Cynthia excels in her courses and still finds time to volunteer for Habitat for Humanity. “Engineers should have an understanding of construction means and methods,” she says, “so that they can make designs efficient and economical.” As to the future, Cynthia intends to work in structural engineering before going on to her master’s.

“My peer group at CCNY is excellent. I have appreciated the opportunity to work in teams.”

Daniel Zegel came to CCNY following four years of intensive Talmudic study at Ohr Somayach Tanenbaum College in Israel and a pre-engineering program at Touro College in New York. At CCNY, he has worked with another student to design a teaching tool that helps students understand the behavior of filters. He has also participated in a workshop on computational modeling and analysis of complex systems in which he was part of a three-person team that worked to model the first activation probability time distribution of a protein complex in the signaling pathway of a cancer cell. “I brought my knowledge of computer engineering to the team, and the other two members contributed their expertise in math and biology. It was an interdisciplinary effort that I found very rewarding,” he says. Daniel is continuing his study of Talmud, and he has tutored at the College’s Accessibility Center, assisting a handicapped student in learning calculus.



Daniel Zegel
Computer Engineering

Major US Department of Education Support Will Help CCNY Boost STEM Graduation Rates

It has been a longstanding City College priority to increase the number of students who graduate in STEM disciplines. Now, a \$4 million grant from the US Department of Education is giving that effort a big boost.

Recognizing that retention of transfer students is a key issue and that many of these students come from CUNY’s community colleges, the funds will be used to establish CILES (Alliance for Continuous Innovative Learning Environments in STEM) to enhance articulation in STEM between CCNY and Hostos and LaGuardia Community Colleges. The object is to create seamless transitions to CCNY’s senior college programs for students at the two feeder schools, many of whom come from underrepresented, low-income backgrounds. Initially CILES will develop a continuous learning environment in earth system science and environmental engineering (ESSEE) and then extend it to other STEM disciplines. Dr. Jorge Gonzalez, NOAA-CREST Professor of Mechanical Engineering, is spearheading the effort, which will be headquartered in the CUNY-CREST Institute.

The continuous learning environment concept will make full use of technologies to which today’s students respond very well, such as social networking and virtual learning, and couple these with plenty of individual attention through tutoring and mentoring. It will emphasize critical thinking skills, building these through a hands-on, laboratory-based approach. It will offer participating students research experience, particularly through NOAA-CREST, a center which exemplifies the multidisciplinary, team-based approach to science and engineering on which CILES plans to build its teaching and learning environment. The program entails a considerable commitment to infrastructure. Breakout rooms will be constructed at Hostos and LaGuardia as venues for tutoring and mentoring. At City, a 5,000 square-foot facility will house a laboratory, classrooms, and breakout rooms.

“The CILES grant is a huge opportunity,” says Dr. Gonzalez. “Our goal is to double the number of ESSEE majors at City by 2016, and increase overall STEM retention rates by 50% over the same period. Being a large urban university, CUNY attracts students from a huge variety of backgrounds. We intend to tackle the challenge of equipping them all with the skills they need to succeed in STEM. We will listen to them, evaluate their challenges, and respond to their needs. Our intention is to graduate well-trained young scientists and engineers who are capable of entering the emerging fields where they can look forward to productive, satisfying careers.”

The CILES leadership includes co-PIs Dr. Yaseer Hassebo of LaGuardia, Dr. Nieve Anguo of Hostos, and Dr. Jeff Steiner of City, as well as Drs. Fred Moshary, Barry Gross, and Karin Block of NOAA-CREST.

An NSF CAREER Award for Dr. Sihong Wang: Taking the Guesswork Out of Treating Cancer



Assistant Professor of Biomedical Engineering Sihong Wang is on a mission to help doctors pinpoint the most effective drug treatments for their cancer patients. Dr. Wang does research in cell and tissue engineering, bioMEMS and thermal medicine. A major focus of her lab is the development of microfluidic cell arrays to study signaling pathways, such as apoptosis and inflammation, for the high throughput screening (HTS) of drugs.

NSF's prestigious CAREER award supports "early career development activities of those teacher-scholars who most effectively integrate research and education within the mission of their organization." Dr. Wang is receiving \$400,000 over five years to perfect a device which has the potential to transform cancer drug screening and ensuing treatment.

The device is based on a 3D microfluidic cell array system, for which a provisional patent has been filed. Tumor samples are placed into a grid designed to simulate human conditions, while various drugs are administered and evaluated for their effectiveness. The current prototype can test ten different drugs on ten kinds of tumors. Dr. Wang's ambition is to scale up the device, so that, in due course, thousands of medications could be tested simultaneously. In a disease where speed of diagnosis and treatment is of the essence, this could dramatically reduce the amount of time it takes doctors to find the appropriate drug for their patients. "It would take only a few hours to a few days, depending on the kinetics of individual drugs, to test many drugs simultaneously using tissue biopsy samples from patients," Dr. Wang explains.

In addition to being a stellar researcher, Dr. Wang is a teacher and mentor of note. Her CAREER project will incorporate up-to-date biotechnologies into the CCNY BME curriculum and provide undergraduate research opportunities, which prepare students for BME careers. For high school students, research experiences will build scientific knowledge and encourage them to major in BME.

Dr. Wang joined the Grove School in 2007, following an NIH Postdoctoral Training Fellowship at the Center for Engineering in Medicine, Harvard Medical School and Massachusetts General Hospital, and a PhD from the University of Texas at Austin. She is collaborating on this project with Dr. Xuejun Jiang, Associate Professor of Cell Biology at Memorial Sloan-Kettering Cancer Center. She will receive a 10% supplement to her NSF award from CUNY.

Three New Research Associates Bolster Excellence in Grove School Labs

Jinzhong Niu

Research Associate, Computer Science

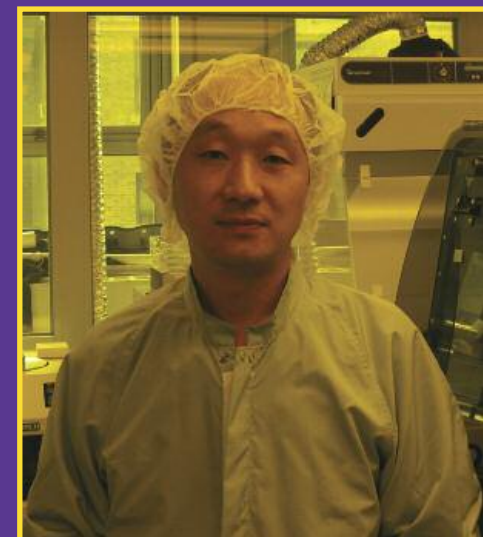
Dr. Jinzhong Niu's connection to CCNY's Department of Computer Science goes back to 2002. His long association with Professor Emeritus Gilbert Baumslag made CCNY's Center for Algorithms and Interactive Scientific Software (CAISS) a natural place for him to pursue postdoctoral research. Dr. Niu, who is also a visiting professor at Nanjing University of Information Science and Technology in China, holds a PhD from the CUNY Graduate Center. His thesis was on "Automated Auction Mechanism Design with Competing Marketplaces." Analytic methods from Game Theory were once the tools of choice for auction mechanism design. However, auctions, which are a crucial component of e-commerce, have become more complex, requiring new methods. That is where Dr. Niu comes in. In CUNY's Agents Lab, he has been seeking experimental approaches to the problem of auction mechanism design. He runs agent-based simulations to analyze markets, in particular, the competition between marketplaces and the dynamics of traders moving between them. A groundbreaker in his field, he led the effort to build JCAT, the open-source platform for running CAT games, which model a scenario similar to the competition between stock exchanges and provide a solid testbed for research.



Youngsik Song

Research Associate, Electrical Engineering

Dr. Youngsik Song comes to City with a doctorate in electrical and computer engineering from Wayne State University. His field is nano electronics and materials, and his prior experience as a research scientist at Wayne State, the University of Arizona and the University of Kentucky has given him an extensive knowledge of nano and micro fabrication. This fits him perfectly for his job, managing the clean room in the lab of Assistant Professor of Electrical Engineering Sang-Woo Seo, whose research interests include using nano materials to make optical sensors and energy devices. Since his arrival, Dr. Song has worked on the development of a nano-wired ultra-capacitor, of optical devices using PMMA and PS microspheres, and on the fabrication of a nano-textured waveguide for optical sensors. He trains students to use the sophisticated clean room machinery and is also an adjunct lecturer in Electronics I and II. "I enjoy seeing how the students grow and develop through both course work and research," he says." Dr. Song lauds the Department of Electrical Engineering's support for cutting edge independent research and the excellence of the peer group which surrounds him.



Xin Xu

Research Associate, Civil Engineering

Dr. Xin Xu was drawn to City by the prospect of collaborating with Dr. John Fillos of Civil Engineering on major research in the field of municipal wastewater treatment. Having just finished her doctorate in Environmental Engineering and Earth Science at Clemson University, she took on responsibility for the chemical analyses associated with Dr. Fillos's project at the bench, pilot, and full-scale levels. The research, which is funded by the NYC Department of Environmental Protection, centers on the removal of nitrogen present in wastewater in the form of ammonia and organic-nitrogen. The object is to comply with nitrogen discharge limits, designed to protect Long Island Sound and the Upper East River. Dr. Xu is responsible for the CCNY Environmental Engineering Lab, where the research takes place. It is her job to ensure that the lab continues to meet the standards of the New York State Health Department's Environmental Laboratory Approval Program. In addition, Dr. Xu is enjoying teaching. In the Environmental Engineering course, she is introducing undergraduates to relevant laboratory techniques, and in the course on Water Quality Analysis, she helps graduate students develop a command of sophisticated analytical instruments and principles.



Dr. Yuying Gosser: A Staunch Advocate for Student Research at the Grove School

“Our mission is to connect students to faculty and to facilitate early participation in research,” says Dr. Yuying Gosser, Director of Student Research and Scholarship at the Grove School. As an NMR structural biologist, she continues to teach a research project-based bioinformatics course and supervise CCNY’s Gateway Laboratory for research training. This allows her “to remain grounded in the community of science and technology, and to introduce cutting edge research to students.”

“Thanks to Dean Barba’s initiative, we have shaped a ‘pipeline’ to enable students’ early participation in research,” says Dr. Gosser. “For incoming freshmen, we have the STEM Institute and the Mini-Circuits (Kaylie) and Grove Scholarships, which entail research; for freshmen and sophomores, we offer research support through NSF STEP grants. We help sophomores and juniors compete for external research internships and seniors apply for graduate research fellowships.”



Dr. Gosser works closely with Grove School faculty. “Faculty mentoring is critical to students’ success,” she says. Her broad research background gives her a clear understanding of the work done in faculty labs, allowing her to match students and mentors. She serves as Executive Editor of the *Journal of Student Research* and organizes the Grove School Annual Undergraduate Research Symposium, which showcases engineering students’ achievements and faculty mentoring.

After obtaining a BS in Polymer Physics and a Master’s of Engineering in China, she earned a PhD in Physical Organic Chemistry and NMR at Brown. She did postdoctoral training in NMR spectroscopy at Yale and in NMR structural biology at Rockefeller University, and then research in Cellular Biochemistry and Biophysics at Sloan Kettering Cancer Center. Working with Grove School faculty added another dimension to her knowledge, enabling her to identify prestigious research institutions with projects appropriate for engineering students, such as the National Institute of Standards and Technology Summer Undergraduate Research Fellowship program (NIST SURF), to which the Grove School has sent eight students since 2010.

In evaluating research projects open to students in the IBM summer internship program in Zurich and Beijing, Dr. Gosser realized that the program, which traditionally drew computer science/engineering and electrical engineering majors, also offered opportunities for civil engineering students. As a result, a civil engineering major was among the record number of Grove School students in the CCNY 2012 cohort of interns.

CCNY and Georgia Tech Collaborate on Research to Help the Visually Impaired

An ambitious, multidisciplinary project involving researchers at CCNY and the Georgia Institute of Technology is opening new worlds of perception and mobility for the visually impaired. The objective is to develop cost-effective mechatronic devices to assist visually impaired people in achieving mobility functions comparable to people with normal vision. Research began at CCNY when Zhigang Zhu, Professor of Computer Science, and YingLi Tian, Professor of Electrical Engineering, both at the Grove School, and Tony Ro, Professor of Psychology

in CCNY's Division of Social Science and Director of the CUNY Cognitive Neuroscience Doctoral Program, joined forces under a \$50,000 City SEEDS grant. This initial research led to a \$2 million project, supported by the NSF Emerging Frontiers in Research and Innovation program, on which they are collaborating with Kok-Meng Lee, Professor of Mechanical Engineering and Director of Georgia Tech's Advanced Intelligent Mechatronics Research Laboratory, and Boris Prilutsky, Associate Professor of Applied Physiology at Georgia Tech.



Dr. YingLi Tian

The team envisions a multifunctional array of wearable sensors that would help the visually impaired navigate by conveying information about their surroundings. The technology would also help firefighters and pilots navigate in poor visibility and will be a boon to the development of intelligent robots. The wide-ranging, complimentary expertise of the team's five members includes: navigation and obstacle detection by robots; higher-level visual understanding by machines; the combination of mechanics and the electronics of information systems; sensory feedback in motor control; and cognitive and neural mechanisms underlying attention, perception, and action.

Together, they are working on creating a relationship between the human brain and machines that can guide motor function through alternative perception, emulating vision by combining electronics and input from the other senses. This entails exploring how the brain processes sensory information and performs motor control tasks as well as investigating the principles underlying the human-machine interaction. "We are trying to enable people who have never had an image of a room, for instance, to build up a mental image," says Dr. Tian. "We use cameras for visual capture, and we develop intelligent algorithms, so that a computer can understand the video. Then, we need to determine how to use sensory information, so that a blind user can understand the environment." According to Dr. Zhu, "We are working on a man-machine collaboration in which we are doing fundamental research on how the brain works out information, attempting to build up a computational model analogous to the human brain, and asking machines to do the same job as people."



Dr. Zhigang Zhu

An important aspect of the project is the involvement of the visually impaired. Its advisory board includes Ms. Barbara Campbell, a senior counselor at the NYS Commission for the Blind and Visually Handicapped, who is herself blind. A master's student and an undergraduate who are visually impaired are part of the research team. In addition, the investigators are working with blind students, between the ages of five and twenty-one, through the New York Institute for Special Education. "The input from the visually impaired is an invaluable reality check as to whether the technology we are developing is valuable or not," says Dr. Zhu.

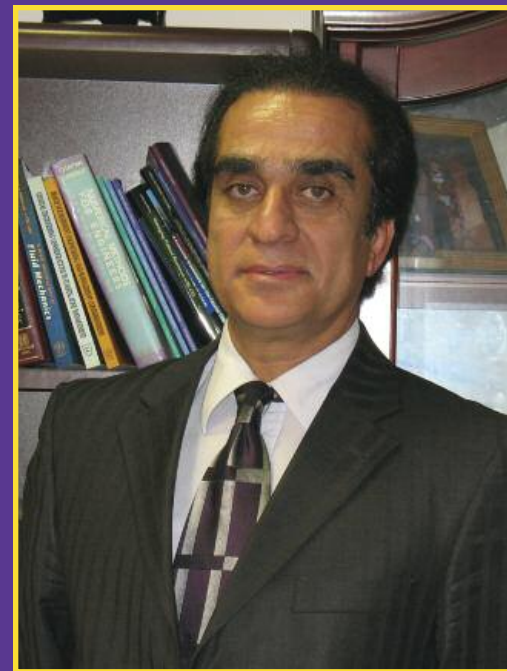
CUNY-CREST Receives \$15 Million NOAA Grant

In 2001, a major contributor to the GSOE mission arrived, when NOAA-CREST was established at CCNY as one of five Cooperative Remote Sensing Science and Technology Centers at minority serving institutions across the nation. Over the past decade, its groundbreaking research and success in training the next generation of scientists and engineers has attracted millions of dollars from NOAA and other sources. In 2010, it became a CUNY-wide institute. Now, as the CUNY Remote Sensing Earth System Institute (CUNY-CREST), it is positioned to become the center of excellence for environmental remote sensing for the northeastern United States, funded from 2011 to 2016 by a new \$15 million grant from NOAA.

Dr. Reza Khanbilvardi, NOAA-Chair Professor of Civil Engineering at the Grove School, has led NOAA-CREST from the beginning. “We have built a unique research infrastructure and assembled a great team of well-known scientists and faculty,” he says. The Institute includes 40 CUNY scientists and faculty members, who are collaborating with NOAA scientists and partners from industry and other universities. NOAA-CREST has drawn internationally-known researchers to CCNY, including Dr. William Rossow, Distinguished Professor of Electrical Engineering; Dr. Jorge González, NOAA professor of Mechanical Engineering; Dr. Charles Vörösmarty, Professor of Civil Engineering and NOAA-CREST Distinguished Scientist; and Dr. Kyle McDonald, Professor of Earth and Atmospheric Sciences.

CREST research focuses on four themes: climate; weather and atmosphere; water resources and land processes; and ocean and coastal waters. According to Dr. Khanbilvardi, “Our research products are being used not only by NOAA, but by other agencies at the federal, state and local level, such as NASA and the EPA.”

NOAA-CREST’s top-flight research goes hand-in-hand with its commitment to education. It has produced more than 500 graduates, 75 percent of whom are from groups underrepresented in the remote sensing sciences. Over 250 research papers have been published in peer reviewed journals and about 450 papers have been presented at prestigious national conferences. It offers undergraduate through doctoral students the opportunity to participate in a vast array of research projects at CUNY and at NOAA facilities across the country, making them excellent candidates for employment in the STEM workforce. “The success of this unique, hands-on, and holistic educational training model is reflected in the fact that most of our graduates find jobs even before they graduate,” says Dr. Khanbilvardi.



The CUNY Energy Institute Transforms Energy Storage with Support from ARPA - E

In 2007, when Dr. Sanjoy Banerjee came to CUNY as Distinguished Professor of Chemical Engineering at the Grove School and Director of the CUNY Energy Institute, he said, “The Achilles heel of renewable energy is its intermittent nature. Our challenge is to match supply and demand for renewable energy through storage.” At about the same time, the Advanced Research Projects Agency – Energy (ARPA-E) was taking shape within the US Department of Energy. It became operational in 2009 with the mission to “explore creative ‘outside-the-box’ technologies that promise genuine transformation in the ways we generate, store and utilize energy.” There was bound to be synergy between the new agency and CUNY’s new institute.

ARPA - E has awarded the Energy Institute \$4.6 million over three years to fund two projects which are revolutionizing energy storage.

Through the first project, with \$3 million in support, Dr. Banerjee is leading the development of a low-cost, grid-scale electrical storage system using a flow-assisted, rechargeable zinc-manganese oxide battery. Ultralife Corp. is a partner in the project. Zinc and manganese oxide are the low cost materials used in disposable consumer-grade alkaline batteries. Attempts to recharge these batteries have been thwarted by the formation of crystalline structures called dendrites, associated with zinc, which caused the batteries to short out, and by the limited ability of manganese to store energy.

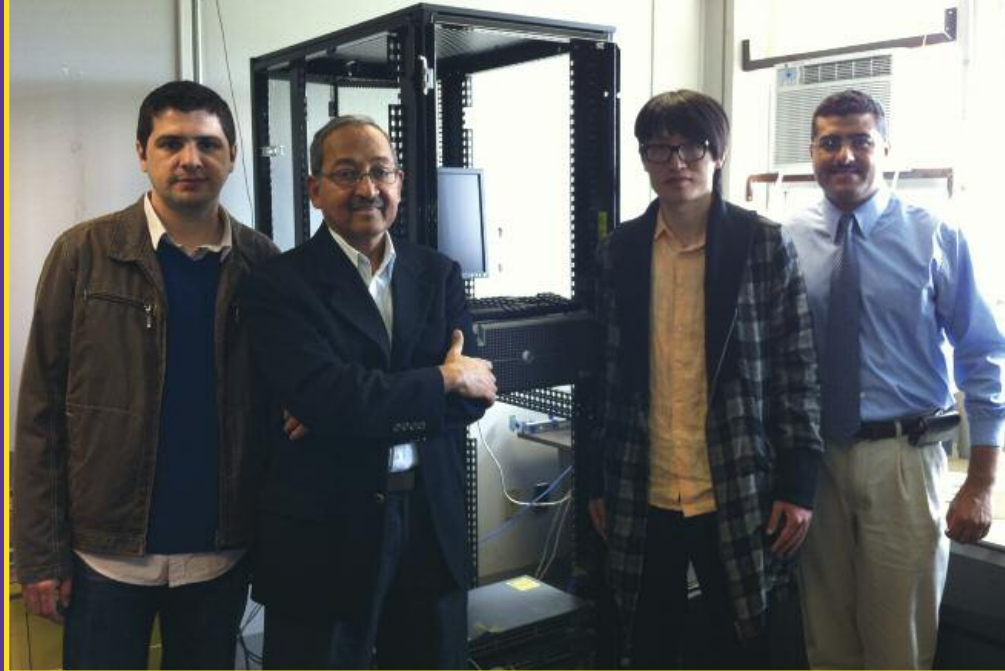


In a major breakthrough, the Institute has developed a flow-assisted zinc anode battery with a sophisticated advanced battery management system (BMS). In the basement of Steinman Hall, thirty-six of the units, strung together and operated by the BMS, charge overnight and discharge during peak daytime hours. In due course, the system should drastically reduce Steinman’s electricity bills. Commercialization of the new battery is imminent, and a next generation, which will combine zinc and manganese oxide, is in the works. According to Dr. Banerjee, it “will further reduce cost while maintaining cycle life.” Ultimately the new technology, which Dr. Banerjee describes as “affordable, rechargeable electricity storage made from cheap, non-toxic materials that are inherently safe,” could replace nickel-cadmium and lead acid batteries in a host of applications.

The second project, with \$1.6 million in funding, is led by Associate Professor of Chemistry Stephen O’Brien. In conjunction with Columbia University and the University of California Berkeley, it aims to develop less expensive, more efficient, smaller, and longer-lasting power converters for energy-efficient LED lights.

“A great deal of energy loss occurs when we transfer electricity from power source to a useful device,” explains Dr. O’Brien. The sophisticated power con-

verters store their energy in “metacapacitors,” a new generation of capacitors made from nanocomposite materials. These can be printed or deposited as a thin film obviating the need for large magnetic components. Dr. Daniel Steingart, Assistant Professor of Chemical Engineering, is a principal investigator on both projects and heads the Printed/Electrochemical Engineering Lab at the CCNY, which is crucial to the research. “The metacapacitors will have built-in switches that will help in the control and conversion of power to the lighting source. Potentially, this technology could be used for many devices, such as solar cells,” he says. “If it scales the way we want, it will enable switching (between energy sources) on the grid to be done more cheaply.”



Research at CINT Enhances National Security

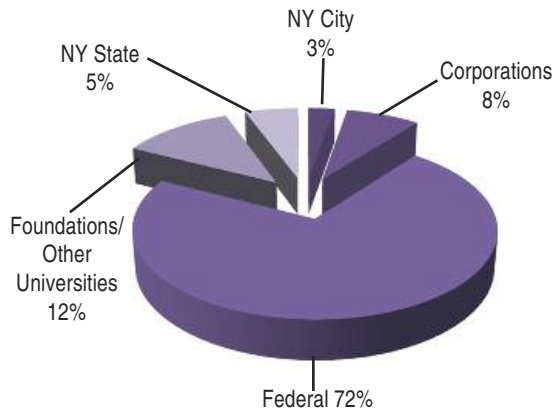
At the Center for Information Networking and Telecommunications (CINT), Professor of Electrical Engineering Tarek Saadawi leads a team of colleagues, graduate students and undergraduates in critical research into multimedia, multiservice, integrated wired and wireless networks, sensor networks, and network security. The Center's work on telecommunications and information distribution has attracted \$2.5 million from the U.S. Army Research Laboratory (ARL). Over the years, another \$3.3 million has come from various U.S. Army organizations, the National Science Foundation, the New York State and the New York City Departments of Transportation, and industry.

CINT's research, drawing on expertise from the Departments of Computer Science and Electrical Engineering, is essential to national security. Its recent ARL project was dedicated to enhancing the mobile communications environment on the battle field, in which it is necessary to overcome significant communications bandwidth and energy constraints, while providing secure, jam-resistant communications in noisy, hostile, wireless surroundings. As well as applying to the military, this work has the potential to dramatically improve civilian emergency response systems, especially in the areas of major disasters and vehicular communications.

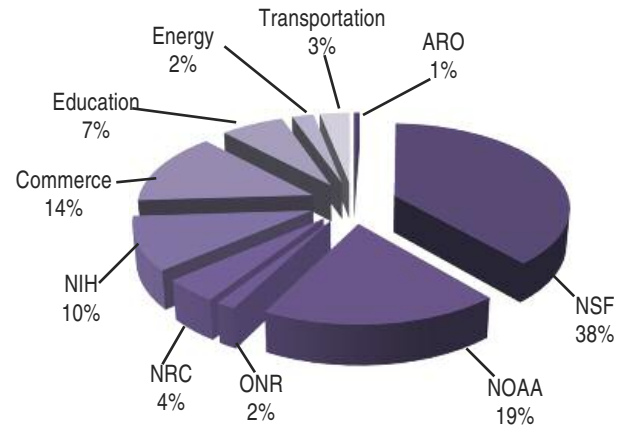
In addition to its ground-breaking research, CINT has partnered with the Institute of Strategic Studies at the Army War College to organize the 2009, 2011 and 2012 Cyber Infrastructure Protection Conferences, held at City College. Chaired by Dr. Saadawi and Colonel Louis Jordan of the Army War College's Strategic Studies Institute, these two-day multi-disciplinary cyber security strategy and policy conferences have brought together leaders in government, business, and academia. Their objective has been to assess the vulnerability of our cyber infrastructure and provide strategic policy directions for that infrastructure's protection. "The cyber security threat grows daily while we, as a nation, are not doing enough to combat it," says Dr. Saadawi. "Our aim is not only to provide attendees with practical information to prevent and combat attacks, but to increase their understanding of how cyber criminals and cyber terrorists think and behave."

Dr. Saadawi and Colonel Jordan have also served as co-editors of "Cyber Infrastructure Protection." This book, available free from the Strategic Studies Institute, provides an integrated view and a comprehensive framework of issues relating to cyber infrastructure protection. Recently, Dr. Saadawi received a National Science Foundation grant to promote international cooperation in cyber security research between the US and Egypt. Under the grant, he will organize the first US-Egypt Workshop on Cyber Security by May 2013.

Funding Distribution by Sources
Total: \$27,718,972



Federal Funding by Agency
Total: 19,958,072



Centers and Institutes

The School of Engineering hosts a number of organized Centers and Institutes. Each of these serves as a focal point for concerted research efforts and competes for external research funding. In addition, GSOE faculty participate in the administration and research activities of two research centers housed in the CCNY Division of Science, the Institute for Ultrafast Spectroscopy and Lasers, and the Center for the Analysis of Structures and Interfaces.

Benjamin Levich Institute for Physicochemical Hydrodynamics

New York Center for Biomedical Engineering

Center for Algorithms and Interactive Scientific Software

Center for Information Networking and Telecommunications

CUNY Institute for Urban Systems

CUNY Institute for Transportation Systems

Center for Water Resources and Environmental Research

CUNY Energy Institute

Institute for Environmental Science and Engineering

Center for Advanced Engineering Design and Development



Agrawal, Anil, NYC DEPT OF TRANS, \$16,998.87, Investigation of 15th and 17th Avenue Bridges in Brooklyn

Ahmed, Samir; Gilerson, Alex; Gross, Barry; and Moshary, Fred, OFFICE OF NAVAL RSH, \$300,000.00, Exploring Techniques for Improving Retrievals of Bio-Optical Properties of Coastal Waters

Arend, Mark; Crouse, David; and Moshary, Fred, GREATER SYRACUSE-COMMERCE, \$2,000.00, Satop

Banerjee, Sanjoy; Kawaji, Masahiro; and Lee, Taehun, BATTELLE, \$135,000.00, Consortium for Advanced Simulation of Light Water Reactors (CASL)

Banerjee, Sanjoy, NYS ERDA, \$200,000.00, Flow Assisted Nickel-Zinc Battery for Hybrid Vehicle Applications Development and Demonstration

Banerjee, Sanjoy, US NAT'L REGULATORY COMM, \$8,000.00, Support for Administrative Assistant for Advisory Committee

Barba, Joseph, AM MUSEUM OF NAT HISTORY, \$25,000.00, Science, Technology, Engineering and Mathematics (STEM) Institute

Barba, Joseph, NYS EDUCATION DEPT, \$110,870.00, CCNY/SCRIP Step Program

Benenson, Gary, NAT'L SCIENCE FDN, \$400,365.00, Physical Science Comes Alive: Exploring Things That Go

Bikson, Marom and Parra, Lucas, SOTERIX MEDICAL INC, \$157,000.00, Targeted Transcranial Electro-Therapy Device to Accelerate Stroke Rehabilitation

Bikson, Marom, COULTER FDN, \$130,000.00, Early Career Translational Research Award - Phase II

Bikson, Marom, EINSTEIN HEALTHCARE NET, \$25,000.00, U Penn/Moss Ctr-Computational Modeling

Bobker, Michael, IMT, \$3,560.37, CUNY Benchmarking Help Center

Bobker, Michael, NYS ERDA, \$269,915.00, Building Automation System Audit Toolkit Development

Bobker, Michael, NYS ERDA, \$182,865.00, Curriculum Development for Small Commercial Energy Auditors

Cardoso, Luis, NAT'L SPACE GRANT FDN, \$4,000.00, NASA ESMD Biocybernetic Test Station CCNY TEAM

Conway, Alison, U OF CONNECTICUT, \$25,000.00, Investigation of Curb Management Strategies to Minimize Freight/Cyclist Conflicts in the Urban Core



Couzis, Alexander, CON EDISON, \$22,500, Colloid Assistance for Alkaline MnO₂ Nanoparticles

Crouse, David, CORNING INC, \$30,000, Industry/University Cooperative Research Center

Crouse, David, GOODRICH ISR SYSTEMS, \$40,000, Industry/University Cooperative Research Center

Crouse, David, NAT'L SCIENCE FDN, \$324,773, IUCRC for Metamaterials

Crouse, David, NORTHROP GRUMMAN, \$5,000, Industry/University Cooperative Research Center

Crouse, David, PHOEBUS OPTOELECTRONICS, \$15,000, Industry/University Cooperative Research Center

Crouse, David, RAYTHEON CO, \$40,000, Industry/University Cooperative Research Center

Diyamandoglu, Vasil, NYC DEPT OF SANITATION, \$434,856, Materials Exchange, Reuse and Sustainability in New York City

Diyamandoglu, Vasil, NYC DEPT OF SANITATION, \$172,780, NY Wastematch Program

Dorsinville, Roger and Crouse, David, PHOEBUS OPTOELECTRONICS, \$30,398, Narrowband Perfect Absorber using Metamaterials

Dorsinville, Roger, CORNING INC, \$25,000, Characterization of Carbon Composites

Fazio, Nelly and Skeith, William, NAT'L SCIENCE FDN, \$457,290, TC: Small: Collaborative: Provable Security from Group Theory and Applications

Fekete, Balazs, UNEP, \$12,500, Global Environment Monitoring System

Fillos, John, NYS ERDA, \$368,485, Autotrophic Nitrogen Removal from High Strength Ammonia Streams using Anaerobic Ammonia Oxidation

Fillos, John, PVSC, \$136,488, Final Settling Tank Modeling

Fritton, Susannah and Payton, Phillip, CORNELL UNIV, \$20,000, National Space Grant College and Fellowship Program

Fu, Bingmei, NIH, \$152,460, Tumor Cell Arrest and Adhesion in the Microcirculation

Gilchrist, Lane, ALFRED P. SLOAN FDN, \$500, Summer Research and Junior Fellowship Program

Gilerson, Alex and Ahmed, Samir, U OF TEXAS, \$237,597, Biological Response to the Dynamic Spectral-Polarized Underwater Light Field

Gonzalez, Jorge, NAT'L SCIENCE FDN, \$130,770, Understanding Impacts of Climate Change on Energy Infrastructure in Urbanized Coastal Area

Gonzalez, Jorge, US DEPT OF EDUCATION, \$458,837, Promoting Postbaccalaureate Opportunities for Hispanic Americans (PPOHA)

Gonzalez, Jorge, US DEPT OF EDUCATION, \$831,607, CUNY's Initiative for Continuous Innovative Learning Environments in STEM (CILES)

Gross, Barry, NYS ERDA, \$104,628, Development of Vertical and Synoptic Tools to Assess and Improve PM2.5 Forecast Predictions

Kamga, C., NJ DOT, \$81,961, University Transportation Research Center Technology Transfer Program

Kamga, Camille and Conway, Alison, JETBLUE AIRWAYS, \$30,712, Strategies to Improve Taxi Service for JetBlue Customers at JFK Terminal 5

Kamga, C. and Agrawal, Anil, NYS DEPT OF TRANS, \$30,600, Bridge-Vehicle Impact Assesment

Kamga, C., NYS DEPT OF TRANS, \$77,000, September 11th Memorial Program for Regional Transportation Planning

Kamga, C., NYS DEPT OF TRANS, \$50,000, Support for NYMTC for CMAQ Application and Documentation

Kamga, C., NYS ERDA, \$114,145, CUNY Building Performance Laboratory

Kamga, C., NYS ERDA, \$49,996, Eliminating Trucks on Roosevelt Island for the Collection of Recyclables and Commercial Waste While Significantly Improving Energy Efficiency

Kawaji, Masahiro, BATTELLE, \$399,190, Investigation of Abnormal Heat Transfer and Flow in a VHTR Reactor Core

Kawaji, Masahiro, NAT'L SCIENCE FDN, \$19,800, U.S. - Japan Seminar on Two-Phase Flow Dynamics, June 6-12, 2012, Tokyo, Japan

Kawaji, Masahiro, US NAT'L REGULATORY COMM, \$100,000, New York-Nuclear Research Opportunities Program (NY-NROP)

Kawaji, Masahiro, US NAT'L REGULATORY COMM, \$400,000, CCNY Nuclear Research Fellowship Program

Khanbilvardi, Reza M. and Merchant, Shakila, NYC DEPT OF ED, \$46,393, Summer Teaching Training in the Earth and Environmental Sciences with Applications to the Physical Sciences

Khanbilvardi, Reza M.; Ahmed, Samir; and Moshary, Fred, US DEPT OF COMMERCE, \$2,625,000, NOAA CREST Center

Khanbilvardi, Reza M. and Temimi, Marouane, US DEPT OF COMMERCE, \$50,000, Land Emissivity Products

Khanbilvardi, Reza M.; Gilerson, Alex; Ahmed, Samir ; and Moshary, Fred, U OF MARYLAND, \$80,000, CICS: Development of an Upgraded Southern Hemisphere Snow/Ice Product

Khanbilvardi, Reza and Gladkova, Irina, U OF MARYLAND, \$60,000, CICS: Development of an Upgraded Southern Hemisphere Snow/Ice Product

Khanbilvardi, Reza and Gross, Barry, U OF MARYLAND, \$30,000, CICS: Development of an Upgraded Southern Hemisphere Snow/Ice Product

Khanbilvardi, Reza M. and Lakhankar, Tarendra, U OF MARYLAND, \$50,000, CICS: Development of an Upgraded Southern Hemisphere Snow/Ice Product

Khanbilvardi, Reza and Mahani, Shayesteh, U OF MARYLAND, \$71,500, CICS: Development of an Upgraded Southern Hemisphere Snow/Ice Product

Khanbilvardi, Reza M. and Merchant, Shakila, U OF MARYLAND, \$12,000, CICS: Development of an Upgraded Southern Hemisphere Snow/Ice Product

Khanbilvardi, Reza M. and Romanov, Peter, U OF MARYLAND, \$344,000, CICS: Development of an Upgraded Southern Hemisphere Automated Snow/Ice Product

Khanbilvardi, Reza M. and Vant-Hull, Brian, U OF MARYLAND, \$22,866, CICS: Development of an Upgraded Southern Hemisphere Snow/Ice Product

Khanbilvardi, Reza M., ALFRED P. SLOAN FDN, \$500, Summer Research and Junior Fellowship Program

Khanbilvardi, Reza M., COLUMBIA UNIV, \$77,700, NE Consortium on Climate Risks (NECCR)

Khanbilvardi, Reza M., NOAA, \$3,500,000, Financial Assistance to Establish Five Cooperative Science Centers at Minority Serving Institutions

Khanbilvardi, Reza M., NOAA, \$149,038, NOAA Cooperative Remote Sensing Science & Technology Center (CREST)

Krakauer, Nir, NASA, \$134,981, Application of Evapotranspiration and Soil Moisture Remote Sensing Products to Enhance Hydrological Modeling for Decision Support in the New York...

Kretzschmar, Ilona, AM CHEM SOC, \$50,000, Controlling the Partial Coalescence of Particle Stabilized Droplets

Kretzschmar, Ilona, CON EDISON, \$15,972, Large Surface Electrodes

Kretzschmar, Ilona, NAT'L SCIENCE FDN, \$6,000, CAREER: Uniquely Functionalized Nanoparticles for Hierarchical Self-Assembly of Three-Dimensional Structures

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Situated on a 36-acre campus in northern Manhattan, distinguished by some of the country's earliest and still most beautiful university gothic architecture, the Grove School benefits from the proud heritage and high record of achievement of The City College – one of the single most powerful avenues of access to the American Dream in our nation.

CCNY's School of Engineering was one of the first public institutions of its kind, and is still the only public school of engineering in New York City. The School's ties to engineering go back to 1853, when City College was known as the Free Academy of New York, and a course in civil engineering was required for all students. In 1919, the College's Board of Trustees approved the creation of a

separate School of Technology with its own dean and faculty, and in 1962 it formally became the School of Engineering and moved to its current home in Steinman Hall. In 2004, the name was again changed to the Grove School in recognition of Andrew Grove '60 ChE, co-founder of the Intel Corporation, and his \$26 million gift to his alma mater.

The Grove School of Engineering holds a position of national standing among public schools of engineering, and is recognized for the excellence of its instructional and research programs, particularly in technologies with relevance to New York City and New York State. It also leads in the breadth of its offerings, with bachelor's, master's, and doctoral degree programs in eight engineering fields – biomedical, chemical, civil, computer, electrical, environmental and mechanical engineering, and computer science.



Continuing in the tradition of the City College mission, access and excellence, the Grove School proudly takes its place as one of the most diverse schools in the nation, consistently graduating high numbers of women and other underrepresented populations, working adults, and immigrants.

Mirroring the renaissance that has spread across City College in recent years, the Grove School has experienced a period of dynamic growth. Over 40% of the students who are admitted to the CCNY Honors Programs plan to choose engineering as their major field of study. In addition, large numbers of graduates from the New York City special high schools, including Stuyvesant, Bronx Science, Brooklyn Tech, and City College's own High School for Math, Science, and Engineering, now make City College their first choice.

And, once students arrive on campus, they make the Grove School proud, piling up honors and awards and

gaining admission to some of the country's most competitive graduate programs.

Some recent instances of student excellence include: Christopher Hue '08, Charlie Corredor '09, Stephen Ma '11, and Jaeseung Hahn '12, who received the prestigious National Science Foundation Graduate Research Fellowship.

Alumni who return to the College comment on how they see themselves in today's students, who are as hard-working and ambitious as they were. This, in turn, is fueling the steadily increasing level of alumni involvement, which is having a huge impact on the Grove School's continuing forward momentum.

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