School of Engineering Team Visits Brazil for Educational Programs
Greg Behrmann, Ph.D.
B.S., Mechanical Engineering, Drexel University, 1989
M.S., Mechanical Engineering, Johns Hopkins University, 1992
Ph.D., Mechanical Engineering, Catholic University, 2009
Greg Behrmann joined the Department of Biomedical Engineering as a clinical assistant professor in August 2012. He has more than 20 years of industrial experience in optical engineering, microfabrication, and medical device manufacturing. He has held senior engineering positions at the Army Research Laboratory and Corvis Corporation. He was a co-founder and vice president of EM Photonics, Inc., and chief technology officer of Potomac Photonics, Inc. In addition to his experience in industry, Dr. Behrmann was an award-winning technology education teacher at Friendship Collegiate Academy, a Washington, D.C., public charter school located in Ward 7.

Masataka Okutsu, Ph.D.
B.S., 1999; M.S., 2001; Ph.D., 2006,
Aeronautics and Astronautics, Purdue University
Masataka “Masa” Okutsu joined the Department of Civil Engineering as a clinical assistant professor in fall 2012. His research in astrodynamics concerns spacecraft trajectories that employ gravity assists, in which a spacecraft flying near planets (or satellites) can increase its flight velocities via slingshot effects. In collaboration with the Jet Propulsion Laboratory, Okutsu has designed and analyzed multiple-gravity-assist trajectories for NASA’s current and proposed missions, including the Cassini mission at Saturn and the Europa Orbiter mission at Jupiter. His work on potential human missions to Mars was covered by the national and international media, including MSNBC and the BBC. His interests also include projects in engineering education. He has, for example, led a team to develop a multiplayer 3D virtual environment, which was then used as a platform to teach an engineering design course offered for university credits.
With great excitement, I write the dean’s message for this issue of *CUA Engineer* because I believe that 2011 – 2012 has been the most successful year during my third term as dean and I can hardly wait to report the school’s achievements to you. I highlight some of its greatest milestones below:

**In 2011 – 2012** the school admitted 96 new undergraduate students, including 80 new freshmen and 16 transfer students. Also 59 new graduate students joined the school. The school granted 56 bachelor’s degrees, 49 master’s degrees, and six doctoral degrees. The names of the degree recipients are displayed in the back cover of this issue.

Our faculty continued their extraordinary performance in teaching, research, and service, as reflected in the number of research grants and published papers and in active service in technical and professional societies as shown in the Faculty Section of this issue.

As the fourth prestigious NSF CAREER awardee in the school, George Mavroidis, Ph.D., an assistant professor of civil engineering, received a five-year NSF grant to conduct research in the area of ground deformations associated with earthquakes. See his story on page 3.

Activities for maintaining the school’s accreditation were conducted punctually, including outcome assessment activities, meetings of departmental advisory boards, students taking the Fundamentals of Engineering exam, and school and departmental surveys, etc, as outlined in the School Accreditation Handbook. The school has been gearing up for the upcoming re-accreditation visit in October 2013.

The school inducted Lt. Cmdr. General Donald Lamontagne, who received a Bachelor of Science degree in engineering from CUA in 1969, onto the Wall of Fame during homecoming in October 2011.

The student exchange program with Hong Kong Polytechnic University (PolyU) continued doing well. During the spring 2011 semester, seven CUA engineering students went to Hong Kong to study at PolyU and four PolyU students studied at CUA. Through the existing 2+2 programs with Vietnamese universities, eight Vietnamese students joined CUA.

Under the leadership of Matt Burns the School Executive Development Board continued to be very active. It held several phone and face-to-face meetings and 100 percent of its members donated to the discretionary fund of the dean of engineering. A career panel for engineering students was successfully organized with participation from most board members and good student attendance.

In August 2011 I travelled with Provost James Brennan to Asia and visited universities in Macau, Hong Kong, and Vietnam, including University of Macau, Hong Kong Polytechnic University, and several major technical universities in Vietnam.

In May 2012, with a CUA delegation that include engineering faculty Jandro Abot and Frank Pao, and physics Associate Professor Duilia de Mello, I visited several universities and research organizations in Brazil. During this trip I signed several memoranda of understanding signifying our intention to develop research and educational programs with the above organizations.

The summer camp Engineering New Frontiers, held during summer 2012, was a big success, with enthusiastic participation from 50 campers who were students from high schools around the country.

As a result of our intensive recruiting efforts, the school is expected to welcome 138 new undergraduate students, including new freshmen, joint degree students, and transfer students. This represents an approximately 45 percent increase in total new students from last year, but, more important, a 70.1 percent increase in new freshmen. In order to deal with the sharp increase of new students this year and the steady rise in the number of undergraduate and graduate students in the last 10 years, I submitted a five-year plan to the provost and the plan was approved. With this plan, in addition to developing new space for research and instruction, the school will hire more faculty, ultimately bringing the number of full-time faculty from 28 to 45, including 40 tenure track and five clinical positions within five years. We already started the hiring process for two new clinical and four new tenure track positions to be filled at the beginning of the next academic year.

Based on the facts presented above, I believe that our school did very well in 2011 – 2012, especially in the area of student recruitment and international programs. I am very glad that we have expanded our international programs to Brazil and progress has been made with universities in India and Taiwan. I hope you will enjoy this issue of *CUA Engineer*.

Regards,

Charles Cuong Nguyen, D.Sc.
Dean, School of Engineering
nguyen@cua.edu
Research Helps Patients Recover Use of Their Hands

Our hands play an important part in our quality of life. With them, we cook and clean, raise a paint brush to canvas, or grasp the hand of a child. For Sang Wook Lee, assistant professor of biomedical engineering, helping to improve the quality of life for those without fully functioning hands is the most interesting part of his research in biomechanics.

“I think what I really like about my research is that most of it can be used, either directly or indirectly, to help people suffering from a disability,” he says. His area of research is specifically with the musculoskeletal biomechanics of the human hand and upper extremity, and neuroscience, with emphasis on rehabilitation engineering for neurologically impaired subjects such as stroke survivors.

In addition to his duties at Catholic University, Lee is a research scientist at the Center for Applied Biomechanics and Rehabilitation Research in the National Rehabilitation Hospital. A current project he is working on involves developing “a novel biomimetic device for effective hand rehabilitation.”

“In another project,” he says, “we try to examine the impairment in the ability of patients to coordinate their muscles; various types of kinematic (motion capture) and physiological (electromyography) measurements are made and analyzed for this purpose.”

Lee, who started working with patients following his postdoctoral training, says there are aspects of his research that sometimes surprise him.

“I think it is quite true when you do any kind of human research, when you look at the data, there is so much variability, both between and within a subject, so much variability and unpredictability in nature, which I did not encounter that often when I was working on just engineering problems.

“Working with patients can be challenging sometimes,” he says. Patients can become disappointed or frustrated because of their disability, although overall they are truly quite optimistic and pleasant to interact with, he adds. But it’s the hope that his research holds for many people that he finds most rewarding.

“When I was conducting a training study at the Rehabilitation Institute of Chicago, I found it quite rewarding to hear from my subjects who were in this six-week training study, that our novel training method really helped them to improve the functionality of their hands — ‘I can now do this and that!’ — and eventually they get to re-use their hands.”

Assistant Professor Sang Wook Lee
Earthquakes are nothing new on our planet— they happen every day, in all parts of the world.

Most of these are small, barely felt by people and hardly affecting structures on the earth’s surface. But others are not so, resulting in destruction seen far too often in the form of collapsed buildings and bridges and lives lost, especially in areas of the world where structural building codes are barely followed or completely nonexistent — places where the earth’s tectonic plates bump up and pull down against each other in an uneasy dance.

George Mavroeidis, assistant professor in the Department of Civil Engineering, would like to see otherwise. His research in the areas of engineering seismology, earthquake engineering, structural dynamics, and structural mechanics is helping to provide answers to how to reduce seismic risk — and prevent those collapsed buildings.

“I view earthquake engineering as a multi-phased process that ranges from the description of earthquake sources, to characterization of site effects and structural response to description of measures of seismic protection,” he says.

“These basic phases incorporate various components, such as occurrence modeling, geophysical modeling, ground motion modeling, stochastic and nonlinear dynamic analysis, and design and experimentation.”

These components are strongly interrelated, he continues, “and only an integrated approach will enable the scientific community to better understand the nature of the earthquake problem, face the research challenges more effectively, incorporate the progress in engineering codes in a rigorous way, and ultimately reduce the seismic risk.”

His research interests also include topics related to the mechanics and physics of earthquakes, deterministic and stochastic ground motion simulations, fracture and frictional processes, and seismic hazard and risk analysis, and computational modeling.

Mavroeidis recently received a five-year Faculty Early Career Development (CAREER) Program Award from the National Science Foundation for a project titled “A Comprehensive Approach for Investigating the Effects of Near-Fault Dynamic Ground Deformations on Engineering Structures,” which studies how intense ground strains and rotations associated with earthquakes affect engineering structures.

“The direct recording of actual rotational motions excited by earthquakes, such as rocking and torsion, is not a trivial task because of the lack of technology for measuring small ground rotations precisely and inexpensively,” he says.

“However, torsional motions can be detrimental to buildings even with small eccentricities, and rocking motions are an important consideration for tall structures such as the towers of cable-supported bridges.”

He is also working on another research grant from the National Science Foundation (2012 – 2013) for a project called “Characterization of Translational and Rotational Strong Motions in the Near-Fault Region, and their Impact on the Torsional Response of Buildings.”

This grant looks at, among other topics, the effects of tectonic region and soil conditions on near-fault ground motions and investigates particular features of the dynamic response of buildings subjected to seismic excitations in the vicinity of the fault.

Mavroeidis teaches undergraduate and graduate courses in structural engineering and mechanics.

Working with other engineers and researchers to find ways of enhancing current knowledge is something that he finds most appealing.

“This interaction between engineers and scientists with different backgrounds is an important aspect of our effort to discover new knowledge, and advance the state-of-the-art and state-of-the-practice — a research goal that I have found to be most exciting and truly very rewarding,” he says.
CUA Explores Research and Educational Opportunities in Brazil

In May 2012 a CUA delegation comprising Dean Charles Nguyen, Professor Frank Pao, Associate Professor Jandro Abot, and Associate Professor of Physics Dulila Mello traveled to Brazil to visit several Brazilian universities and research centers. In Rio de Janeiro, their first stop, the delegation met with key administrators of the Pontifical Catholic University of Rio de Janeiro. There Dean Nguyen signed a memorandum of understanding (MOU) to start exploring research and educational programs between the two universities. The group then visited the Federal University of Rio de Janeiro (UFRJ), a public university in Rio, and discussed a potential collaboration between CUA and UFRJ.

The delegation went on to Sao Paulo to meet with key personnel at the Sao Jose campus of Technological Institute of Aeronautics (ITA). Three ITA students attended CUA through the Brazilian Science without Borders program in spring 2012. The Catholic University delegation discussed ways to increase the number of ITA students coming to CUA through the Science without Borders program, among other topics.

Next the group visited the National Institute for Space Research (INPE) in Sao Jose dos Campos and the Universidade Cruzeiro do Sul (UNICSUL) in Sao Paulo. At INPE, discussions centered on ways INPE students could attend CUA for graduate study in conjunction with NASA. At UNICSUL, Dean Nguyen and UNICSUL’s provost signed an MOU to explore initiatives in research and education.

Travelling on to Brasilia, the group visited the University of Brazil, which has three Science without Borders students at CUA during fall 2012, meeting with administrators of the Coordination of Improvement of Higher Education Personnel, a federal agency in Brasil.

On their return to Washington, the delegation followed up with the universities and centers they had visited and submitted proposals to the CUA administration to implement initiatives with those schools.

Exploring Educational Programs in Asia

A Catholic University delegation comprising Dean Charles Nguyen, Provost James Brennan, and Professor Frank Pao, director of the School of Engineering international programs, traveled to Asia from Aug. 8 to 16, to explore new educational opportunities at several Asian universities and research centers.

On Aug. 8, the delegation met with Professor Philip Chen, dean of the Faculty of Science and Technology of the University of Macau (UM), and discussed a potential collaboration between CUA and UM. Brennan signed an agreement with the provost of Hong Kong Polytechnic University (PolyU) on Aug. 9 to renew an existing student exchange program between CUA and PolyU.

After visiting the PolyU campus and meeting the staff of its international office, the members of the CUA delegation met with the key administrators of PolyU at a dinner hosted by PolyU President Timothy Tong.

Brennan and Nguyen then traveled to Vietnam on Aug. 10. Accompanied by Uyen Nguyen, director of International Programs in Asia, they visited with Monsignor Nguyen Van Kham, auxiliary bishop of the Archdiocese of Ho Chi Minh City and his staff on Aug. 11. The CUA group then met the president and vice presidents of Saigon Technology University, where Nguyen gave a presentation to students who were interested in studying at CUA.

On Aug. 12, the delegation visited the key administrators of Ho Chi Minh City University of Technology and the International University of Vietnam National University-Ho Chi Minh City to support the educational programs with those universities.

The CUA leaders traveled to Danang on Aug. 13 and met with key officials of Danang University of Technology (DUT) and parents of DUT students who were studying at CUA. During the meeting with the parents, Brennan and Nguyen had the opportunity to address their questions about academic programs and student life at CUA.

The final leg of the trip was spent in Hanoi, where the delegation visited with officials of the National Center for Technology Progress (NACENTECH) of Vietnam. CUA gave several proposals to NACENTECH aimed at attracting its researchers to CUA.
Taiwanese Students Explore American Culture and Education

The CUA School of Engineering has established a relationship with Fu Jen Catholic University (FJCU) since 2006 through several visits of the administrators of the two universities at each other’s campuses and the signing of several memoranda of understanding (MOU) between the two institutions. In order to provide FJCU students with an opportunity to explore American culture and education, a one month summer program was initiated in 2010 and was offered for the first time in 2011. In July 2011, a group headed by Professor Joseph Arul, and consisting of 19 juniors in science and engineering and several faculty and staff members came to CUA and lived in Opus Hall for the month. During their stay, students attended a three week short course with the topic “Intelligent Systems” that was proposed by FJCU and conducted by Dean Charles Nguyen. This short course had a lecture portion and a laboratory portion that demonstrated some of the theoretical concepts covered in the lecture portion. Students worked in small groups on a course project. They had to prepare a written report and orally present the project to the instructor and participants. Before the program actually took place, Professor Frank Pao and Professor Joseph Arul worked together for several months for the planning of the program, which entailed a student selection process, travel arrangement, housing and meals, short course topic, and logistics. Outside the classroom, students had time to visit attractions in the D.C. metropolitan areas such as museums, monuments, and toured its major attractions and cultural and commercial centers. After the conclusion of the short course, the group travelled in the northeast part of the United States. They also visited several major universities including Princeton, Harvard, and MIT. Based on the good experience with the program in 2011, the summer program was offered again in summer 2012. This time CUA hosted two faculty members and 19 students who were mainly freshmen and sophomores of the College of Management and College of Science and Engineering from FJCU. Dean Nguyen gave a short course with a focus on technology management. Each student participating in this program received a certificate of completion indicating the covered topic. A highlight of the 2012 group activities in D.C. was the visit to the Library of Congress and Capitol building on June 28. Before entering the Library of Congress in the morning, the group witnessed a vigorous demonstration in front of Supreme Court related to the court’s ruling on the constitutionality of Obamacare that day. Then in the afternoon in the Capitol, the group viewed the live debate in the House chamber concerning the contempt of Congress motion against U.S. Attorney General Eric Holder Jr. — a historic moment and a demonstration of democracy in action! At this time, the summer program is planned for summer 2013 with a short course focusing on medical robotics.
Catholic University Welcomes Brazilian Science Without Borders Students

The Catholic University of America welcomed seven top-ranked Brazilian undergraduate students to campus, the first of an anticipated 100,000 Brazilian undergraduates studying abroad over the next four years under the auspices of Brazil's Science without Borders program. Science Without Borders, initiated last year by Brazilian President Dilma Rouseff, provides scholarships (full tuition plus room and board) to Brazilian undergraduate students, primarily in the fields of science, technology, engineering, and mathematics (STEM). The students study for one year at colleges and universities in the United States and around the world and return to Brazil to complete their degrees.

The first group of students at CUA spent the spring and fall semesters on campus and interned at NASA Goddard Space Flight Center in Greenbelt, Md., during the summer. Six students studied in the School of Engineering—Fernando R. Jaeger, Guilherme Cruzatto Silva, Lucas Sousa de Oliveira, Matheus F. F. Teixeira, Pedro H. Doria Nehme, and Tito Fideles da Silva. Another student, Victor Addono, came to CUA as a mathematics major in the School of Arts and Sciences. A new group of students enters CUA in fall 2012: Ludmila Schincariol and 11 other engineering majors and two architecture majors.

When the program was announced in Brazil in August 2011, Associate Professor of Physics Duilia de Mello, a native of Brazil and a research associate at NASA Goddard Space Flight Center, seized the opportunity and spearheaded the effort to bring students to CUA and offer them internships at NASA. She then contacted School of Engineering Dean Charles Nguyen, who in turn asked Jandro Abot, associate professor of mechanical engineering and materials science and engineering, to coordinate the program within the school. Abot and de Mello established a one-year Space Science and Engineering program for the students to start their studies at CUA. Roy Braine, director of international student and scholar services at CUA’s Center for Global Education, was instrumental in ensuring a timely adjustment of the students to CUA and the United States. Provost James Brennan and several other colleagues at CUA and at the Institute of International Education, who manages the student applications in the United States, supported the effort and contributed to set up the program in a few months.

Abot academically advises the engineering students in their engineering and science courses. The students can also enroll in courses offered by the local consortium of universities and are thus able to further specialize in their studies or match courses of their own corresponding Brazilian programs of study. All seven students did very well academically during the spring semester and added to the international culture at CUA.

The School of Engineering is very pleased to host the Brazilian students and looks forward to continuing to provide them the best possible educational experience. Obrigado!

Latest from M.S. Degree Program in Materials Science and Engineering

In a recent interdisciplinary offering, The Catholic University of America has introduced a Master of Science degree in Materials Science and Engineering (MSE). Many fields of science and engineering are concerned with selection and design of materials. As a result, the graduate program is drawing a diversity of full- and part-time students interested in enhancing their careers.

The program is housed in the School of Engineering but will draw on expert faculty and resources from the School of Arts and Sciences. The program has a strong research component, which is facilitated by CUA’s Nanotechnology Center. The curriculum emphasizes advances in existing and emerging technologies in six areas: nanotechnology; biomaterials; magnetic and optical materials; glasses, ceramics, and metallurgy; processing and instrumentation and structural materials. The program’s evening course offerings and affordable tuition has appealed to working professionals. In the addition, the courses and professors prepare students to face real world challenges. For details on the Materials and Science Engineering Program, visit http://materialscience.cua.edu
In today’s difficult economy college upperclassmen are under extra pressure to secure a job prior to or immediately after graduation. This is often much easier said than done, even for the traditionally bright students in the field of engineering. What sets CUA students apart from the hundreds of other qualified, young college graduates? How can a student land that first “dream” job? One word: alumni. CUA School of Engineering students and graduates can turn to successful alumni who want to help answer these questions and put students’ “dreams” within reach.

On Friday, April 27, six members of the School of Engineering Executive Development Board served as panelists on a “Preparing for the Workplace” Q&A session for students. Approximately 30 students attended, each asking how to make the transition from a full-time student to a full-time employee.

Carrie Maslen, board member and vice president of Global Channel Development at SAP, the world’s largest inter-enterprise software company and the world’s third-largest independent software manufacturer, moderated the event, sometimes turning the tables to challenge students with questions as well.

What main point did the panel drive home? Learn how to sell yourself and be able to tell “your story,” for example by explaining how your past decisions have brought you to that particular interview.

The panel discussion was well received by the students, so much, in fact, that plans are afoot to make this an annual event. For more information, please contact the dean’s office at 202-319-5160.
Alumni Corner

1950s
William Elsen, B.A.E. 1954, was employed for 31 years at the Goddard Space Flight Center of NASA and retired in 1993.

James G. Winkler, B.E.E. 1956, spent 40 years at NRL, participating in the design, fabrication, testing, and launching of more than 70 earth orbiting satellites and spacecraft. In June 1998, he was awarded “Pioneer” status for his contributions to one of the earth’s earliest reconnaissance satellite programs. He retired in 2001.


1960s
John Eicher, B.C.E. 1962, M.C.E. 1965, Ph.D. 1970, retired in 1994 as a senior executive with the U.S. Department of Transportation (DOT). He worked as an engineering consultant until 2002. He received the Presidential Rank Award from DOT and the Distinguished Engineering Alumni Award from The Catholic University of America.

Joseph Suraci, B.E.E. 1962, retired from Lockheed Martin in 2002 after 32 years of service. Currently, he is a lead assessor for ISO 17025. He served as president of the NCSL in 1975, and was the recipient of the NCSL Wildhack Award.

William Carey, B.M.E. 1965, M.S. 1968, Ph.D. 1974, currently is a professor of mechanical engineering at Boston University and editor of the Journal of Oceanic Engineering. In addition, he is an Institute of Electrical and Electronics Engineering (IEEE) — Oceanic Engineering Society fellow and past recipient of the society’s Distinguished Technical Achievement Award, Distinguished Service Award, and an IEEE Millennium Medal. He is also a fellow of the Acoustical Society of America and recipient of their 2007 Pioneers of Underwater Acoustics Medal.

John Mecholsky, B.C.E. 1966, M.C.E. 1968, Ph.D. 1973, is a professor at the University of Florida in the Materials Science and Engineering Department. Throughout his career at the university, he served as the associate chair (2009–2010), chair of the Faculty Senate (2009–2010), and on the Board of Trustees (2009–2010). He was recipient of Graduate Advisor of the Year Award in 2009 and Teacher of the Year Award in 2006.

Joaquin Hangen, B.E.E. 1967, M.E.E. 1969, is a former executive at Lockheed Martin and HNS, as well as a founding member of Blu Venture Investors and Entec Ventures. Currently, he sits on the boards of CertusNet, Van Gogh Imaging, and SmartSenseCom.

Charles Heller, Ph.D. 1968, published his memoir, Prague: My Long Journey Home, in December 2011, it has already received two awards. His book is available on Amazon.com, barnesandnobles.com, or directly from the publisher at www.abbottpress.com.

1970s
Francisco Garcia-Sanchez, B.E.E. 1970, M.E.E. 1972, Ph.D. 1976, spent 35 years as faculty member at Simon Bolivar University (USB) in Caracas, Venezuela, where he is now professor emeritus. During his time at USB, he was coordinator of undergraduate and graduate studies in electronics engineering, coordinator of research and development in engineering and applied sciences, and creator of the Solid State Electronics Laboratory. He has published more than 150 articles, co-wrote a book on MOSFET modeling, and was the editor of specialized collective books. He is a distinguished lecturer in the IEEE’s Electron Devices Society and recipient of numerous research awards. Presently, his research interests lie mainly in the area of semiconductor device modeling.

Gerard Bohlander, B.S.Ch.E. 1971, M.S.E. 1972, retired in 2008 from a 35-year career as an ocean engineer with the U.S. Navy’s Naval Surface Warfare Center. He now works as a marine technology consultant.

Joseph Ricci, B.S.Ch.E. 1975, retired from the federal government after a 34-year career, the last 29-plus with the U.S. Army Environmental Command as an environmental engineer and technical adviser. Since 2008, he has been a regional workforce coordinator for the Susquehanna Workforce Network in Maryland, helping job-seekers find employment.

Thomas Wallen, B.Ch.E. 1977, an AIChE Fellow, serves as president of Rappahannock Engineering and is managing member of Thomas J. Wallen P.E. He is also an adjunct professor of chemical engineering at Howard University.

1980s
David Morgan, B.E.E. 1983, received his Ph.D. from Brown University in 1988. He worked at Lockheed Martin in the Digital Signal Processing group until 1995, and now is at Fidelity Investments serving as vice president responsible for their technology and planning of voice and data networks. Also an author, he wrote Neural Networks and Speech Recognition and How to Build a Speech Recognition Application: A Style Guide for IVRs.

Azmin Isa, B.C.E. 1988, is the general manager of Negeri Sembilan Cement Industries.

1990s
Antonio (Tony) Delgado, P.E., B.M.E. 1993, has been named the Market Sector Leader for Alliance Engineering’s Food and Personal Care Sector. The sector will offer a more focused approach to providing engineering and construction services to food, household, and personal care product manufacturers.

David Stovall, B.E.E. 1993, M.E.E. 1996, has been with Raytheon, Airborne AIGNT, since the completion of his master’s degree and is now the chief engineer. During this time, he was involved with the designing and fielding of a major SIGINT system that is still deployed. He was also the lead engineer on other related SIGINT projects over the years.

Rolando Maynulet Montilla, B.C.E. 1994, is partner at RiMA Construction Group.

Bryan Walsh, B.M.E. 1997, is the station manager for Gallagher Station, a 280-MW, coal-fired power plant in New Albany, Ind., and Markland Hydro Station, a 65-MW power plant in Vevay, Ind. He also spent almost two years consulting part-time, funded by the Electric Power Research Institute, to further his graduate school research.

2000s

Brendan Walsh, B.M.E. 2002, presently is serving as a captain, U.S.M.C., at Eglin AFB, Fla., assigned to learn and instruct the F-35B Joint Strike Fighter.

Michael Corrigan, B.E.E. 2003, was promoted to the distributed receiver exciters lead for the Navy’s AMDR program.

Matthew Pinckney, B.M.E. 2005, was recently promoted to counsel in the Boston office of Hoffman Warnick LLC.

Stephen Matta, B.S.C.S. 2006, is the lead developer at DIT Inc.

Christopher Ratto, B.E.E. 2007, graduated from Duke University with a Ph.D. in electrical and computer engineering. His dissertation is titled “Nonparametric Bayesian Context Learning for Buried Threat Detection.” He joined the Johns Hopkins University Applied Physics Laboratory in Laurel, Md., as a senior professional staff member in June 2012.

Paul Yantosh, B.C.E. 2008, works as an engineer in training for the Ports and Waterways Division at Urban Engineering in Philadelphia.

Sean Cooke, B.M.E. 2011, recently completed the Engineering Basic Leader Course at Fort Leonard in Wood, Miss. He will be an airborne army engineer with the 82nd Airborne Division at Fort Bragg, N.C.

Scientists from around the world presented more than 200 papers on recent developments in the field of laser microfabrication during the 13th Annual International Symposium on Laser Precision Microfabrication (LPM) on the campus of Catholic University, June 12 to 15.

LPM is an increasingly relevant field to a wide variety of industries, including microelectronics, biomedical devices, telecommunications, and the automotive and defense industries.

Approximately 200 people participated in the four-day symposium held at the Edward J. Pryzbyla University Center.

Topics of presentations and papers included fundamental aspects of laser-matter interactions, process monitoring and control, nanotechnology, ultra-short pulse laser processing, micro-patterning and micro-structuring, micro-machining, 3-D micro- and nano-fabrication, drilling and cutting, welding and bonding, wafer dicing, lithography, medical and biological applications, optics and systems for laser microprocessing, photochemistry, and glass/ceramic processing.

Three special sessions were added to the symposium line-up, including “Periodic Surface Nanostructures,” “Sub 100 nm Manufacturing with USP lasers,” and “Laser Materials Processing Using Shaped and Structured Illumination.”

As modern technology becomes increasingly reliant on miniaturization and microfabrication to improve the performance of many devices and systems, lasers are more commonly being used in both production and research environments, “making these topics of significant interest to researchers in both industry and academia,” according to a pamphlet prepared by symposium organizers.

Scott Mathews, associate professor of electrical engineering at CUA, served as symposium co-chair, along with Alberto Piqué of the U.S. Naval Research Laboratory, Washington, D.C. Koji Sugio, of RIKEN, Japan was general conference chair. Symposium sponsors included Catholic University and the Japan Laser Processing Society.

The symposium for industry and academic researchers is held in alternating years in Japan, and then in various cities around the world. Mathews said he was excited that Catholic University was the host site for this year.

Mathews, who said he believes in a hands-on approach to teaching his engineering students, indicated that he was pleased to see significant student participation. “Housing in the dorms has allowed many students to attend who otherwise might not have been able to cover the expense of such a conference,” he added. About 30 of the presentations were given by students, said Mathews.

Woongsik Nam of Purdue University won best student poster and Adrian Patrasciou of Universitat de Barcelona won best student presentation.

All presented papers will be published in the LPM Proceedings.

Mathews said he was pleased the symposium went well, with many attendees enjoying the walking tour of the National Mall, as well as the conference dinner banquet aboard the ship Odyssey. “The weather was perfect throughout the conference,” said Mathews. “We had participants from all over the world, too many countries to count.” With approximately 160 technical presentations, he added, it was not possible to single out one or two for special attention, as all the presentations added to the base of knowledge in the field.
Off-Campus Programs in the School of Engineering

Nader Namazi, the academic director of off-campus programs for the School of Engineering has announced that the school has initiated a plan to establish more off-campus programs in the Washington metropolitan area in fall 2012. “We have already initiated programs in three sites: Fort Belvoir Night Vision and Electronic Sensors Directorate, the Naval Surface Warfare Center, Carderock Division, and the National Institute of Health,” Namazi says, “Among these initiatives, the program in NVESD is by far the most sustaining and successful one and the program in NIH is currently inactive.”

The school’s off-campus programs lead to the Master of Science in Engineering, and focus on electrical engineering, mechanical engineering, and engineering management. The goal of the degree programs is to provide students with both theoretical underpinnings and in-depth, real-world practitioner expertise in signal/image processing, acoustics, antennas, electromagnetic propagation, vibrations, controls, and thermal-fluid sciences. The programs also offer courses in engineering management and core technical topics that support the accompanying research areas. The curricula can also lead to a Ph.D. in engineering.

Namazi cited several points particular to the off-campus successes. “As a result of the off-campus activities, there have been research collaborations between the sites and the CUA faculty,” Namazi says. “In addition, some students who completed the requirements for master’s degree have been encouraged to pursue doctoral work. Finally,” he says, “the funds provided by the off-campus programs have been instrumental in supporting our on-campus graduate programs in the School of Engineering.”

E-Week Introduces Students to Engineering

Engineering Week is the engineering school’s annual festivity known fondly by engineering students as E-Week. This year’s events took place from February 6 to 10. Each day during E-Week, a different engineering group sponsored an activity in which all University students were invited to participate. The Pryzbyla Center lobby was the main location for the events, though some took place in Pangborn Hall. Students stopped by on their way to class to participate in or simply watch as their peers tried their hands at the various activities.

The American Society of Mechanical Engineers started off the week with an event called “Break it” in the Pangborn parking lot. Moving from breaking to bending, on Tuesday the Biomedical Engineering Society sponsored an origami session, where students learned how to create their own origami figures. Engineers Without Borders’ Wednesday event was a demonstration of their traditional non-Newtonian Fluid. Thursday, students took part in a raffle fundraiser held by the American Society of Civil Engineers (ASCE), the proceeds of which went to raise money for the concrete canoe and steel bridge teams’ trips to compete at Virginia Tech. ASCE also sponsored an event in which University students built individual mini canoes. To end the week, ASCE held a toothpick bridge-building event, with students working together to build individual toothpick bridges.

E-Week ended with the engineering school’s annual Engineering Ball, sponsored by Society of Women Engineers. As usual, this University-wide event was held at Maggiano’s Little Italy in Friendship Heights. Dean Nguyen announced the winner of the week’s events at the ball. The mechanical engineering department took the pride prize this year for having the most attendees at the various E-Week events. With the help of the dean’s office and all the engineering student organizations, we were able to put on another very successful E-Week celebration.
A basketball championship, especially one where the players are four feet tall, have bodies of steel and brains full of circuits, is bound to bring excitement. Ask the hundreds of high-school students from D.C., Maryland, Virginia, Pennsylvania, New York, and several other states who cheered their robots on during the FIRST Regional Robotics Competition held at the DC Convention Center on March 29–31, 2012. In each game the robots were given 30 seconds to autonomously score as many free throws as possible. After that, students tele-operated their robots, hoping to score as many points as possible while cooperating with each other and preventing the other team from scoring.

FIRST (For Inspiration and Recognition of Science and Technology) uses robotics competitions to inspire young students to succeed in science and technology. As part of these efforts, the Department of Electrical Engineering and Computer Science (EECS) at CUA was invited to showcase its robotics research and program during the competition. The CUA exhibit highlighted the research efforts of the Robotics and Artificial Intelligence Laboratory headed by Assistant Professor Erion Plaku that work toward enabling the robots to plan intelligently and be more autonomous. The EECS staff, particularly Felicia Echols, was instrumental in ensuring that the exhibit ran smoothly. Motivated by robotics applications in inspection, vehicle automation, and search-and-rescue missions, undergraduate students Minh Le, Pham Phuong, and Joseph Lattisaw showcased their projects, in which the robots autonomously explore unknown environments and move to a desired destination while avoiding collisions with static obstacles and moving objects.

The EECS CUA robotics exhibit generated a lot of excitement among the high-school students, who discussed with the CUA students and faculty how to make their robots more autonomous and easier to control. As a result of this activity, Alex Wallar (George Mason High School), Vladimir Utchin (George Mason High School), and Devon Luce (Montgomery Blair High School) worked in Plaku’s robotics lab this summer, developing programs that combine motion planning with voice commands so that a person can tell the robot in English where to move and the robot moves on its own to the desired destination. These programs are also being developed as applications for smart phones so that robots can be controlled via Android or iPhones.

EECS is committed to foster even closer collaborations with DC FIRST Robotics. As part of these efforts, the department will host representatives from DC FIRST Robotics to discuss joint projects and opportunities to mentor high school teams participating in these competitions. This collaboration will further highlight research and educational efforts and inspire more young students to advance science and technology.

Fourth Senior Design Day Shows Undergraduate Growth

For decades, CUA School of Engineering students have been planning and executing senior design projects as part of the undergraduate curriculum. In May 2009, Binh Tran, assistant dean, with the help of Afshin Nabili, M.B.E., laboratory supervisor, created a special event for the students to publicly display their hard work.

The SOE 4th annual Senior Design Day event was held on Monday, April 30, 2012, in the Edward J. Pryzbyla University Center. Approximately 70 senior students (solo or in groups of two to four) from all departments in the school presented their recent research and results orally and as posters. Judges from inside and outside the School of Engineering ranked the presenters in different categories, including but not limited to project significance, engineering design, prototype development, quality of the work, and presentation. The winning team from each department received a monetary prize.

The 2012 Senior Design Day Departmental Winners:

**Biomedical Engineering**
Print-Sthetic 3D Printer & Scanner
Group members: Billy Vermillion, Kimberly Fabyan, Amanda Carter, Ben Nguyen

**Civil Engineering**
The Floating House
Group members: Tri Minh Le, Maureen Sullivan, Tom Scotto, Tim Guckvan

**Electrical Engineering and Computer Science**
A Reconfigurable Architecture for Very Long Instruction Word Processors
Michael Metz

**Mechanical Engineering**
Wind Energy Harvester
Group members: Samantha Daubman, Michael Marcian
Design Center Takes Shape

In 2010, the School of Engineering launched a plan to renovate the existing McCarthy Building, located to the rear of Pangborn Hall and primarily unused over the past decade, into a state-of-the-art engineering design space. Plans were approved by the University in fall 2011 and preliminary renovations began in winter 2012. The engineering design center complements and builds on the school’s practical, hands-on engineering curriculum and state-of-the-art faculty research in which students learn how to design, develop, and build complex systems that meet the needs of contemporary society.

“This is an exciting venture for the School of Engineering,” says Binh Tran, assistant dean for engineering. The renovations have been designed by Norman Smith Architecture, reports Tran. “It has been a pleasure working with them. They have taken our needs and core values of inspiration, creativity, and collaboration and designed a space that I believe students will really love.”

The engineering design center, which is unnamed as yet, features space allocated for 15 to 20 senior design workstations, fully equipped with high-speed computers and design, modeling, and simulation, data acquisition, and instrumentation software. The center has a dedicated conference and meeting room as well as a nearly 600-square-foot machine shop and fabrication facility. Intended to simulate a real-world professional environment, the design center will facilitate interdisciplinary design teams across engineering programs, which will foster and enhance team and leadership skills among students.

“We expect the new facility to enhance the quality and sophistication of senior design projects, be an inviting space for engineering students, and further improve the success of the annual senior design day symposium,” Tran says.

A groundbreaking ceremony for the new facility will take place in fall 2012.
New Strategic Plan Prepares Engineering to SOAR to New Heights

Fall 2012 marks the conclusion of an ambitious five-year strategic plan during which CUA engineering experienced unprecedented growth and success: The School of Engineering has seen a nearly 50 percent increase in graduate and undergraduate enrollment and a 67 percent increase in research expenditures by faculty. New programs of study in the areas of green/alternative energy and materials science were established to meet the growing needs of the region and nation. Further, the school has strategically developed and expanded off-campus graduate program offerings to professionals at the Night Visions and Electronic Sensors Directorate (NVESD) at Ft. Belvoir, Va., as well as increasing the number of students in the highly successful engineering management program located in Crystal City, Va.

Helping to raise CUA’s research profile, engineering faculty, leaders in their fields, have organized and hosted several conferences on campus over the past five years, including the 23rd Southern Biomedical Engineering Conference in 2007, the Metropolitan Biophotonics Symposium in 2009, the American Society of Civil Engineering’s Regional Conference in 2010, and the 13th International Symposium on Laser Precision Microfabrication held during summer 2012. CUA faculty also have been highly successful in attracting extramural research funding. Since 2007, four CUA engineering faculty have received the prestigious and highly selective National Science Foundation CAREER Award, most recently Assistant Professor of Civil Engineering George Mavroeidis, Ph.D., in 2011. Engineering faculty have been recognized with the highest CUA honors over the same period receiving the Provost’s Excellence in Teaching (Associate Professor of Mechanical Engineering John Judge in 2007; Associate Professor of Electrical Engineering Scott Mathews in 2010; and Associate Professor of Mechanical Engineering J. Steven Brown in 2011). In 2008, Mathews and Associate Professor of Biomedical Engineering Jessica Ramella-Roman received the Provost’s Excellence in Research award.

Some of the biggest successes of the strategic plan are the accomplishments of CUA engineering students. The hands-on emphasis of the CUA curriculum has impressed upon students the roles engineers play in practice and research. Since 2009, graduating seniors have presented their senior design projects at the annual Engineering Design Day, a conference-style format combining oral and poster presentations by design teams. For two consecutive years, the CUA steel bridge team has won first place at the ASCE regional conference and has acquitted itself well at the national steel bridge competition. CUA undergraduates Megan Jamiokowski and Jenna Graham were selected for the prestigious Barry M. Goldwater scholarships in 2009 and 2010, respectively, and Danika Coaplin, biomedical engineering, was selected as an honorable mention for 2012.

As co-chair of the Strategic Plan Committee, Binh Tran, assistant dean, and Jeff Giangiuli, engineering management director, agree that the 2007–2012 School of Engineering Strategic Plan captured the vision of the school’s dean and faculty. Says Tran, “It enabled the school to make significant progress in undergraduate and graduate recruitment, facility upgrades, research initiatives and centers of excellence, and expansion of its off-campus programs.” Adds Giangiuli, “The school achieved over 90 percent of the Strategic Plan metrics in the five-year period.”

Building upon the success of the previous five-year strategic plan, the School of Engineering has developed an even more ambitious CUA Strategic Plan, the 2012–2017 engineering strategic plan, known as SOAR Plan, focuses on four major areas: 1) structures and services, 2) opportunities for collaborations and partnerships, 3) academic excellence, and 4) research pre-eminence. The new plan sets specific goals for establishing new research and academic facilities; improving infrastructure for academic and research services; increasing the number of collaborations and partnerships with federal laboratories and industry; creating new, exciting, and timely academic programs; and increasing the profile of CUA engineering regionally, nationally, and internationally.

Says Dean Charles Nguyen, “Having achieved our previous five-year goals, we look forward to these new challenges.”
Academic Partnerships Bring Diversity and Opportunity to CUA

CUA’s School of Engineering has a longstanding and proud tradition of academic excellence and a strong reputation within the local and mid-Atlantic region. In an effort to increase diversity within the CUA community, for the past several years the school has aggressively developed and renewed strategic partnerships through 3+2 and 2+2 dual degree programs with liberal arts colleges and international universities, as well as transfer articulation agreements with area community colleges.

Community College Transfer
Over the past year, the school has finalized and/or renewed transfer articulations with Anne Arundel Community College (AACC), Howard Community College, and Prince George’s Community College, which has facilitated the transfer of students to CUA’s engineering programs. Community college transfer students such as graduating seniors Billy Vermillion and Kenny White from AACC often make a successful transfer to CUA and perform at the top of their classes. The School of Engineering is finalizing discussions for articulation agreements with other local area community colleges.

Domestic Dual-Degree Programs
Another concerted effort over the past few years has focused on strategically pursuing dual-degree programs with religiously oriented liberal arts colleges with institutional missions that match or complement that of Catholic University. One such example includes a renewal of a 3-2 agreement with St. Vincent College located in Latrobe, Pa. During a spring 2012 visit there, Dean Charles Nguyen and Assistant Dean Binh Tran spoke to interested St. Vincent students about the opportunities for transfer students at CUA. “Being able to complete two degrees within five years—a mathematics degree at St. Vincent and an engineering degree at CUA—provides these students with both technical and practical training for their future careers, a distinct advantage in the marketplace,” says Tran.

During the summer, CUA finalized a 3+2 agreement with Eastern Mennonite University (EMU) located in Harrisonburg, Va. It was the culmination of a two-year effort. The first EMU student participating in this program will join the CUA mechanical engineering program in fall 2012.

International 2+2 Programs
Another growing group of transfer students include those from Vietnamese universities. Through formalized 2+2 transfer programs with International University in Ho Chi Minh City and the University of Danang in Vietnam, roughly 30 undergraduate and graduate Vietnamese students are currently studying at CUA. The students benefit from the CUA experience and bring with them strong technical expertise that benefits the research work of faculty members as these talented students eagerly assist them in their research projects. Students graduating from the 2+2 program often continue on to complete master’s degrees at CUA before joining domestic doctoral programs.

Diversity, Talent, Cultural Exchange
These academic partnerships have had a positive effect on the culture of CUA Engineering. The increased diversity and infusion of new talent expose CUA students to new cultures, customs, and the unique conditions of incoming students. Those incoming students in turn are invited to share the CUA core values of reason, faith, and service with others.

Civil Engineering Professor Receives Accolades
Gunnar Lucko, Ph.D., associate professor of civil engineering at CUA and director of the construction management program, has received the 2011 Thomas Fitch Rowland Prize together with Eddy M. Rojas of the University of Nebraska. They were recognized for their technical paper, “Research Validation: Challenges and Opportunities in the Construction Domain.”

The award is given for the best research paper in the Journal of Construction Engineering and Management, which is published by the American Society of Civil Engineers. In their paper, the authors categorize various techniques and illustrate them with examples of best practices. In selecting this paper for the award, the committee particularly noted “the unique value to all construction researchers by clearly outlining characteristics, selection, and proper application of validation techniques.”

Lucko also was installed as chair of the executive committee of the Construction Research Council for the 2012–2013 term during its business meeting at the 2012 Construction Research Congress at Purdue University. This council of the American Society of Civil Engineers (ASCE) is the premier association of North American construction researchers, charged to “advance engineering knowledge and practice through stimulating and encouraging innovative research in the field of Construction Engineering and Management.” In his new leadership role, Lucko will represent the community of construction researchers to ASCE, oversee committees, and facilitate initiatives for upcoming conferences.
Professors Get Behind STEM Education

Science, technology, engineering, and mathematics (STEM)-focused curriculum in K-12 and higher education has gained popularity over the last decade in the United States, directly addressing the need to increase the future workforce’s education in the sciences and provide a foundation for technical innovation.

Several of Catholic University’s engineering faculty participate actively in STEM programs. Gunnar Lucko, associate professor of civil engineering, notes that the STEM professions “create the systems and products that enable our modern life.”

“Yet the construction industry, for example, faces a major challenge in the lack of interest from the next generation and a poor reputation among society,” he continues. Every semester since 2005 Lucko has mentored a group of students at a high school in the Columbia Heights neighborhood of Washington, D.C., through the ACE Program (Career Opportunities in Architecture, Construction, and Engineering).

“Having witnessed firsthand the interest of the students once they discover technical challenges and explore them through hands-on activities, I hope that even more professionals will join the important mission of building the next generation,” he says.

Scott Mathews, associate professor of electrical engineering, began his own informal “science outreach” program about 10 years ago.

“Through my children (one in elementary school, the other in high school) and a few friends who teach in local public schools, I have been able to gain access to many classrooms full of young students, ranging from 4 to 17 years old,” he says.

“I bring scientific equipment into the classroom that most teachers would not have available: lasers, microscopes, oscilloscopes, etc. I do demonstrations and give presentations on a wide variety of science topics.”

He says he always finds that students are more interested and more engaged when watching a hands-on experiment or demonstration, as compared to reading a textbook.

Otto Wilson, associate professor of biomedical engineering, is heavily involved in STEM activities. His research on enhancing the healing and remodeling of bone is integrated into his K-12 outreach program. The Biomimetics, Orthopedics, and Nanomaterials Education/Composite Research for Advanced Biomaterials (BONE/CRAB) Lab where Wilson works involves middle and high school students in conducting long-term biomedical engineering-based research projects, as well as undergraduate students in developing STEM learning modules for local schools in the District of Columbia.

He also works personally with Bladensburg High School, McKinley Tech High School, and a number of D.C. STEM Catalyst Schools through the Adopt a Professor Program for Learning Enhancement (APPLE), which Wilson developed as part of his National Science Foundation CAREER Grant (2007–2013) and continues to run.

A number of biomedical engineering graduate students have assisted Wilson as part of the D.C. Inquiry Based Learning Project, working with elementary and middle school students at a number of afterschool programs.

Thanks to the guidance of those advisers, says Wilson, “those students developed, implemented, documented, and presented exciting STEM projects, which were displayed at the project’s culminating event, Turning Up the Sound on Science, held at the Carnegie Institute in May.”

One of Wilson’s high school student mentees, Alston Clark, recently won a National Science Fair competition last July, he adds.

The greatest inspiration for his efforts in K-12 education outreach, he says, stems from insights into the biology of bone, one of his favorite materials. But the heart of his STEM efforts “is to ensure that all children in D.C. and beyond are able to achieve their full potential in terms of STEM achievement.”

High school student and National Science Fair winner Alston Clark, with Associate Professor Otto Wilson in biomedical lab at CUA.
Electrical Engineering Professor Honored at Edison Patent Awards Ceremony

Associate Professor of Electrical Engineering Scott Mathews received an NRL Edison (Patent) Award at the 44th Annual Naval Research Laboratory (NRL) Annual Research Publication Awards Dinner on March 16, 2012. He and co-inventors Alberto Piqué, Ray Auyeung, and Bhanu Sood were honored for U.S. Patent # 8056222 “Laser-Based Technique for the Transfer and Embedding of Electronic Components and Devices.” Of 77 patents considered for 2011, four were selected, representing 13 inventors and four patent attorneys.

The awards were originally instituted to recognize the authors of the best NRL scientific publications during the preceding calendar year. In 1991, the NRL Edison (Patent) Awards were established to recognize outstanding patents issued in the previous year to NRL by the U.S. Patent and Trademark Office. The awards recognize significant NRL contributions to science and engineering that are perceived to have the greatest potential benefit to the country.

The method invented by Mathews and his collaborators constitutes a new laser-based technique for transferring and embedding microelectronic components into a substrate or circuit board, and subsequently connecting the components with laser-printed “wires.” This technique is known as “lase-and-place” because it is analogous to the traditional “pick-and-place” technique, widely used in the electronics industry today.

Successful Alumnus Inspires Students

Andy Youniss B.S.C.S. 1980, returned to the University on April 3, 2012, to present a lecture on main frames to Programming Languages and Theory of Computing classes. Youniss is co-founder, President, and chief executive officer of Rocket Software Inc., a global software development firm. At Rocket, he established and still manages the company’s largest Original Equipment Manufacturer partnership. Youniss worked previously as a programmer/analyst and project development consultant for American Management Systems. He is also a former development manager for DB View Inc.

The faculty and administration were honored to have Youniss at the school to address and motivate the computer science students. Erion Plaku, Ph.D., assistant professor of computer science, said, “Mr. Youniss showed the students new and exciting opportunities in the industry, making full use of their educational degree. The presentation gave the students a much needed perspective on how the courses that they take prepare them for successful careers.”

Dean Nguyen acknowledged how privileged this institution is to have alumni like Andy Youniss. “We are very fortunate to have Andy personally invested in our success. It is individuals like Mr. Youniss that provide stability for our future.”
CE Student Earns Scholarly Rewards

Brenda Tedrick, a rising junior civil engineering major with a concentration in construction engineering, has been awarded multiple scholarships since beginning her academic career at CUA. As a freshman, she received a Matching Funds Scholarship from the AACE International National Capital Section and a scholarship from the Associated Builders & Contractors of Metro Washington. Tedrick received two additional scholarships in her sophomore year; the first was from the American Society of Civil Engineers National Capital Section and the second, was a second-year-award from AACE International.

Tedrick is also active around campus. She joined the steel bridge team as a freshman and served as a co-captain of the team during the 2011–2012 academic year. The team has placed first in the regional conference two years in a row and team members plan to build on that success in the future. She is a member of Catholic Daughters of the Americas, Alpha Phi Omega (a national service fraternity), and has served on the executive board of the ASCE Student Chapter for two years. During summer 2012, Tedrick completed an internship with Westinghouse Electric Company, in Pittsburgh, Pa. After graduation she plans to work as a project manager in construction management.

John Mather Nobel Scholar

Tareq Alosh, B.M.E. 2012, was named a John Mather Nobel Scholar in July for his research into and design of a cryogenic thermal conductivity measurement device at NASA Goddard Space Flight Center. While interning for NASA last year, Alosh proposed a design for such a device, and after its enthusiastic reception, returned to the agency this year to begin its fabrication. During the final weeks of the project’s completion, he was awarded the most distinguished award a NASA intern can receive. John Mather created the award shortly after his acceptance of the Nobel Prize in Physics in 2006 to recognize those who have made significant contributions to scientific research and show strong potential as researchers.

Alosh accepted his award from Dr. Mather personally, along with a scholarship that will fund travel expenses related to professional conferences in which he will present the findings of the research he has performed at NASA. “I am surprised and very humbled that I’ve been chosen for such an honor,” says Alosh. “Working at NASA is rewarding enough, but I never thought I would spend the day getting to know a Nobel Prize winner.”

Tareq will continue his research with NASA as he completes his final semester of a M.S. in mechanical engineering in the upcoming semester.
Mechanical Engineering Student Shares Master’s Research
by Kristopher Reynolds, B.M.E. 2011, M.S. 2012

This research deals with a method of controlling a Stewart Platform Manipulator with an adaptive compliance control system. This system uses LabVIEW software with position feedback in joint space to control the motion of a platform in six degrees of freedom. The platform has low natural compliance, which makes the platform resistant to external forcing and unwanted deflection. An adaptive compliance control algorithm allows for higher specified compliance for any combination of six degrees of freedom in Cartesian space. This gives the operator the ability to design and shape complex paths, with different effective stiffness, damping, and inertia for on- and off-path motion. One primary application of this development is for robotically assisted rehabilitation. A physician or therapist can design a specific path for a desired upper extremity rehabilitation motion.

Upper extremity motion is complex, having many degrees of freedom. Modeling a robotic system according to the biomechanics of the human arm can be very difficult and also computationally demanding. Many motions of the human arm can be controlled with significantly lower degrees of freedom, and thus it can be worthwhile to formulate trajectories that are not as complex, but still describe some natural upper arm motion. With the aid of a Stewart Platform Manipulator (SPM), these constrained trajectories can be accomplished. Since the SPM has high intrinsic stiffness, unwanted deflections are not a concern in the motion planning procedure. The stiffness of the system along six degrees of freedom in Cartesian space can be modified according to an adaptive compliance algorithm, by the initial configuration of a payload (non-inertial) platform is not a fixed state, but rather the minimum distance to a predefined configuration path in 6D non-Euclidian space.

The SPM’s complexity and rigidity allow for a promising approach to command a payload platform through several different configuration paths. A 6D mass-spring-damper model in Cartesian space will govern the velocities according to external forcing from a6DOF force/torque transducer and operator-defined effective mass, stiffness, and damping.

The Cartesian space velocities are converted to joint-space velocities via an inverse Jacobian matrix, which are then sent to a controller to execute the desired motion. Adaptive compliance control is considered when the prescribed configuration path is not strictly along one of the six possible degrees of freedom. In other words, the configuration path combines elements of the possible six Cartesian variables according to some discretized function.

Electrical Engineering Research Paper Wins Burke/Yannas Award

The American Burn Association recognized a paper by Ph.D. student Thu Nguyen and coauthors, describing Nguyen’s research on early detection of infection in burns using thermal images. The paper, titled “The Novel Application of a Spatial Frequency Domain Imaging System to Determine Signature Spectral Differences Between Infected and Non-Infected Burn Wounds,” received the “Burke/Yannas bioengineering best paper award.” The award is presented for original research studies in the field of bioengineering and given to one paper selected by the Program Committee each year.

The Center for Disease Control estimates that up to 4,000 burn victims die each year as a result of infection. Early detection is key to successful burn infection treatment, which in turn can reduce the amount of time burn victims must remain hospitalized. Nguyen has been working with Associate Professor Jessica C. Ramella Roman for more than three years on using optical imaging techniques to diagnose severe electrical and thermal burns. She conducted clinical studies in collaboration with the Burn Center at MedStar Washington Hospital Center in Washington, D.C. This joint research between Catholic University and the Burn Center has been published in several journals and presented at conferences.

The American Burn Association, with 3,500 members in the United States, Canada, Europe, Asia, and Latin America, is dedicated to promoting and supporting burn-related research, education, care, rehabilitation, and prevention. Members include physicians, nurses, occupational and physical therapists, researchers, social workers, firefighters, and hospitals with burn centers. Nguyen has been a certified member of the association since 2010.
In March 2011, the student chapter of the Society of Hispanic Professional Engineers (SHPE) was founded at CUA. The chapter was established to help increase the Hispanic student population in engineering at CUA. Sandra Ruiz, now a junior biomedical engineering student, immediately became an active and proactive member; she was elected president of the chapter for the 2012–2013 academic year.

One of Ruiz’s first SHPE actions was a push to assist in the National Building Museum Engineer Family day. “This became a profound moment for our student chapter,” she says. The chapter was recognized by the CUA leadership community and received an award for its community service in the D.C. area. Ruiz realized then that “this was the start of an incredible organization.” Her participation in SHPE motivated her to support her local community in the Palmdale, Calif., area. This summer she reached out to the Lockheed Martin Educational Outreach Program and was able to assist at and coordinate multiple STEM summer camps for middle schools. “I was given the opportunity to create and teach lesson plans to different STEM summer camps ranging from 35 to 75 students. As a benefit, I was able to network with Lockheed Martin and NASA engineers.” This “unforgettable experience,” Ruiz says, “will serve as the basis for SHPE in the upcoming 2012–2013 school year.”

One of the chapter’s goals during the 2012–2013 academic year is to provide the foundation to help members succeed in their individual career goals while having fun. Among the planned academic activities are networking with professors on and off campus, which includes luncheons, talks, and trips to engineering affluent locations; attending conferences; participating in community service; and providing tutoring sessions. Beyond academics membership in SHPE can lead to long-lasting friendships. “Soccer tournaments, ping pong matches, movie nights, and dinner hangouts,” Ruiz says. “We offer multiple opportunities for succeeding in the engineering world and in life.”

Joseph Husted and Alexandra Wildes, who graduated with Bachelor of Civil Engineering degrees in 2012, jointly received the 2012 Student Award from the National Capital Chapter (NCC) of the American Concrete Institute (ACI). The award is presented to students “who have shown an interest in concrete materials, concrete construction, and concrete design or have actively participated in concrete-related competitions organized or sponsored by ACI.” Husted and Wildes served as co-captains for the CUA concrete canoe team and were nominated by the CUA Department of Civil Engineering to share the award. The students accepted the award and made a presentation on CUA concrete canoe activities during the award dinner held, April 17, 2012, at the Crowne Plaza Hotel in Tysons Corner, Va.
CUA IEEE Student Chapter

The IEEE Student Chapter at The Catholic University of America, reestablished in spring 2012, may be small in numbers but it’s large in enthusiasm and accomplishment. Early in the spring 2012 semester during a micro-electronics lecture, electrical engineering students learned about the Institute of Electrical and Electronics Engineering from faculty adviser Associate Professor Scott A. Mathews. Their curiosity piqued, the students investigated to find out what the IEEE is, what role it plays in electrical engineering, and what it would mean to be a part of it. After Mathews explained the professional and academic advantages of being members of the IEEE, the students realized that membership would not only be an honor but would also open doors to many other opportunities.

“What the IEEE meant to us (the class of 2013) was to finally have a student body that we as electrical engineers could identify ourselves with, just like the other engineering disciplines,” says Gabriel Issacs, Class of 2013. “Little did we understand that we were just scratching the surface at the realm of opportunity that becoming an active IEEE branch would give us.”

Founding a student IEEE chapter opens up several avenues to CUA electrical engineering students. They will have more opportunities to network, compete, and exchange ideas with students in other established engineering schools within the region, which includes universities from D.C., Maryland, Virginia, Ohio, Pennsylvania. They will also be able to attend regional conferences that encompass everything from career fairs with reputable professionals in the region to attending robotic fairs. Membership in the IEEE also allows individual students to explore their particular areas of interest within the electronics field and gives each one access to accredited libraries within that field, benefits that are anticipated to have considerable impact on students’ research.

The volunteer-driven chapter is not the first at CUA. “We assume it had a bit of a hiatus,” says Issacs. “But since we’re the largest electrical engineering class in the last five years, we felt it was only right that we be the ones to resuscitate it.”

The group held elections for the required cabinet positions in spring 2012. Gabriel Isaacs is interim student branch president, Weishou Huang, interim student branch vice president; and Wiaam Al-Salmi, interim branch treasurer. The group’s 20 members, all juniors and registered with IEEE, have begun recruiting sophomore and freshman electrical engineering students for membership.

“What we achieved last semester might not seem to be much,” says Isaacs, “but in such a short period of time, our group was recognized not only by the University but also by the IEEE headquarters as a reactivated branch with updated positions to meet the current requirements.”

Issacs says, “We are thankful as students of CUA’s electrical engineering department to be given the opportunity to join the IEEE. The academic and career support membership gives us will have considerable impact on our lives.”

Faculty and Staff Recognized for Excellence

The school annually recognizes faculty members who stand out among their talented group of colleagues. The Charles H. Kaman Faculty Excellence Awards and Burns Faculty Fellowship Awards were established through endowments from gracious alumni, and are yearly reminders of the hard work and dedication that is put into producing successful School of Engineering graduates.

The student-nominated 2011–2012 Kaman Award for Excellence in Teaching was presented to Jandro Abot, clinical associate professor of mechanical engineering. His clinical role in the school allows him to spend much more time in the classroom than a tenure-track professor. His devotion to the students is obvious each and every day.

Peter Lum, associate professor of biomedical engineering, and Esam El-Araby, assistant professor of computer science, were co-recipients of the 2011–2012 Kaman Award for Excellence in Research. Lum’s area of study is the application of engineering methods to develop novel interventions for rehabilitation of movement following neurological injury. His focus is upper-extremity motor impairments after stroke, TBI, and amputation.

El-Araby founded and directs the Heterogeneous and Biologically-inspired Architectures (HEBA) laboratory in the Department of Electrical Engineering and Computer Science at CUA. HEBA is a research and educational laboratory whose primary focus is developing innovative biologically inspired computing architectures and expanding the potential uses of reconfigurable systems, hardware acceleration, and heterogeneous architectures in general.

The Burns Faculty Fellowship Award was established by the Burns family as an incentive for junior faculty. The first recipient, Lin-Ching Chang, assistant professor in the Department of Electrical Engineering and Computer Science, joined the faculty in fall 2007. In the past eight years she has worked with researchers at NIH on computational neuroscience projects focusing on quantitative image analysis of diffusion tensor magnetic resonance imaging (DT-MRI) data. Recently, Chang has extended her research, working with faculty in the physics department at CUA and researchers at NASA on a computational astronomy project to develop an automatic processing pipeline for processing the white-light coronagraph data.

Arash Massoudieh, assistant professor of civil engineering, was the second recipient of this year’s Burns award. Massoudieh joined the Department of Civil Engineering in 2008. His research concentrates on developing innovative techniques for modeling the fate and transport of contaminants and pathogens in aquatic environments such as streams, groundwater, and surface runoff.

Although the faculty members are the school’s foundation, the school’s staff helps keep operations flowing and ultimately keeps the “foundation” together. The dean honors one staff member each year who goes above and beyond his or her role. The 2011–2012 Staff Excellence Award recipient was Afshin Nabili, laboratory supervisor. Nabili is a biomedical engineer who received both his bachelor and master’s degrees from the school. According to fellow staff, faculty, and students, he is an absolutely essential member to the school community.
NSWC Carderock Division Welcomes Engineering New Frontiers Summer Program

by Nicholas Malay, NSWCCD Public Affairs

Naval Surface Warfare Center Carderock Division (NSWCCD) curators, scientists, and engineers hosted students from The Catholic University of America’s Engineering New Frontiers (ENF) Program at Carderock’s West Bethesda campus on June 26. The overall objective of ENF is to introduce high school students to the five different facets of engineering that CUA offers and the purpose of the visit was to become familiar with NSWC Carderock Division, the Navy’s technical lead in hull, mechanical, and electrical engineering.

Students were involved in tours and demonstrations such as the computer-aided design concept session; the friction stir welding lab; the solid waste lab; curator of model shop and SeaPerch testing; and demonstrations in a real-life hydrodynamic test tank in the Maneuvering and Seakeeping (MASK) basin.

A structural girder used to support the main engine in a Navy ship demonstrated how commercial computer-aided design and engineering tools can augment the experience and education of the engineer to optimize the development of a product. “High definition video and sophisticated virtual reality are so commonplace to these future engineers that demonstrating a whiz bang animation of a simulation does not really make any lasting impact,” said NSWCCD engineer Ben Kassel.

This interactive demonstration illustrated the cooperation between naval architects, marine engineers, and mechanical design engineers required to select and arrange the parts, and develop the support structure necessary to provide the ship’s propulsion. Following a discussion of general and equipment arrangements, the demonstration concentrated on the optimization of a girder supporting a main engine.

“How do you compete with PIXAR for the wow factor?” asked Kassel. “What you can do is show how these engineering tools can be used to amplify the engineer’s skill to improve the art of design. The students walk away with an understanding that it takes a combination of the really cool tools, experience, and education,” said Kassel.

The students were encouraged to voice their opinions and discuss options for improving the support structure. The significance of experience and education in the decision making that occurs during the design process was emphasized. The demonstration culminated with a graphic showing the average starting and mid-career salaries of the top 20 job fields of the undergraduate class of 2012.

“It is important to leave the students with an appreciation that the math and engineering classes they will be taking over the next several years have relevance in the ‘real world’,,” said Kassel.

ENF is a weeklong, residential summer camp for rising high-school juniors and seniors held on the CUA campus, and convened this year from July 22 to 28. The program enables students to engage professionals in their chosen field through a unique combination of exclusive behind-the-scene site visits, engaging lectures, and hands-on projects.

These high school students not only got a glimpse of what it would be like to major in engineering, but also saw what professional engineers in a wide variety of disciplines do every day,” said Mary Kate Zabroske, CUA’s ENF director.

NSWCCD’s goal in science, technology, engineering, and math outreach is to interest more students into STEM field and ultimately help the Navy maintain its edge as the high-tech service of the future.

“The tours at NSWC Carderock allowed the Catholic University engineering summer program students to segue engineering principles from ‘on paper’ to engineering disciplines conducted in real life,” said Lena Brauner, CUA senior and ENF mentor. “The subject matter experts translated exposure to the real world of naval engineering, and furnished an appreciation of the cutting edge work accomplished at NSWC Carderock.”
Student

Awards, Service, and Honors

Tareq Alish receives the School of Engineering’s Anthony Scullen Award for Academic Excellence, 2012; Department of Mechanical Engineering’s C.C. Chang Award for Academic Excellence, 2012

Matthew J. Beben volunteers for one year of service after graduation at Christian Brother Volunteer of New Orleans, May 2012.

Amanda Carter, Kimberly Fabyan, Ben Nguyen, and Billy Vermillion from biomedical engineering participated in the national 2012 National Institute of Biomedical Imaging and Bioengineering’s Design by Biomedical Undergraduate Team (DEBUT) Challenge, submitting their senior design project entitled “Print-Sthetic 3D Printer and Scanner.”

Biomedical Engineering

Angela DeMarco of Engineering.

Junior: Caleb Capozella, Lucia Irazabal, Kaitlyn Lafferty, James Morgan

Sophomore: Nicholas Jarboe, Reagan McCloskey, Angeline Premraj

National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH), April 2011 – April 2012, $300,000.


Faculty Grants


Presentations and Publications


Chang, L-C., “IRESTORE and Beyond,” Program on Pediatric Imaging and Tissue Sciences (PPTIS) Seminar, National Institute of Child Health and Human Development (NICHD), National Institutes of Health (NIH), Informed RESTORE and Beyond, May 2011.


El-Araby, E., Kilic, O., Smith, A., and Dang, V., “Investigating Interferometric Imaging in Random Media using CUDA and Jacket Environments for GPUs,” the 9th International Applied Computational Electromagnetics Society Conference (ACES 2012), Columbus, Ohio, April 2012.


Frenkel, V., Wang, S., Shin, I.S., Hancock, H., and Jang, B.S., Paik, C.H., Dreher, M.R.,


Massoudieh A., Lobochefsky E., Zang J.,


Pan, T. Chen, J., and Huang, X., “Numerical Investigation into the Stiffness Anisotropy of Asphalt Concrete from a Microstructural Per-


- Ramella-Roman, J.C., *OASIS Conference*, Tel Aviv, Israel, 2011


- Ramella-Roman, J.C., “Use of polarized light imaging and sensing in the clinical set-

- Ramella-Roman, J.C., “A study on retinal superficial vasculature and structure using a combined flow oximetry and OCT system,” *Inter-Institute Workshop on Optical Diagnostic and Biophotonic Methods from Bench to Bedside*, Bethesda, Md. (Invited Talk).


- Ramella-Roman, J.C., Yong-Ping Chen, Jiefeng Xi, Jiasong Li, Jessica Mavadia, Xingde Li, “Gold nanocubes with enhanced scattering as OCT contrast agents,” *Proc. SPIE 8213 – 97*, 2012.


- Ramella-Roman, J.C., Quanzeng Wang, Du Le, and Joshua Pfefer, “Broadband UV-Vis optical property measurement in layered turbid media,” *Biomedical Optics Express* 3(6), 1226 – 1240, 2012.


Wilson, Jr O.C. and Omokanwaye, T., Bio-mimetic Processing of Chitin Nanocomposites, accepted for inclusion in Biopolymer Nanocomposites (P Laly, editor), 2012 (Invited Book Chapter).


**Activities**

Abot., J.L., Ph.D., Advisory Board member, Materials Science and Engineering program.

Chang, L-C., Ph.D., Academic Advisory Board, the DC Association for Computing Machinery (ACM) Academic Advisory Committee, Sep. 2008 – present; Technical Program Committee: International Online Conference on Information Technology (IOICT ’11), Oct. 30, 2011.

Choi, J., Ph.D., a reviewer of IEEE Visualization 2011 conference; member of ACS/IEEE International Conference on Computer Systems and Applications 2011 Program Committee.

El-Araby, E., Ph.D., panelist and reviewer for submissions of Major Research Instrumentation (MRI) proposals Directorate for Computer and Information Science and Engineering, National Science Foundation, 2012; panelist and reviewer for submissions of research proposals to Computer Systems Research program, Division of Computer and Network Systems, Directorate for Computer and Information Science and Engineering (CISE), National Science Foundation, 2011; guest editor for International Journal of Reconfigurable Computing (Hindawi-IJRC); program committee member in the IEEE Transactions on Computers; program committee member of embedded hardware design in the Journal of Microprocessors and Microsystems (Elsevier-MICPRO); program committee member in the Journal of Parallel Computing Systems and Applications (Elsevier-PARCO); program committee member in the Journal of System Architecture, JSA (Elsevier — The EUROMICRO Journal); program committee member at the International Workshop on Dynamic Reconfigurable Network-on-Chip (DRNoC 2012); publications chair, 9th ACS/IEEE International Conference On Computer Systems and Applications (AICCSA 2011), December 2011; program committee member at the International Conference on ReConFigurable Computing and FPGAs (ReConFig 2011); program committee member at the workshop on Multiprocessor Systems on (Programmable) Chips (MPSoC 2011), July 2011; program committee member, VII Southern Programmable Logic Conference (SPL 2011), April 2011.

Frenkel, V., Ph.D., Institutional Animal Care and Use Committee (IACUC) of The Catholic University of America; Technical Program Committee for scientific conferences of the IEEE – Engineering in Medicine and Biology, San Diego, Calif., 2012.


Mathews, S., Ph.D., “K-12 Science in the Classroom” lectures and demonstrations at Takoma Park Elementary School and Montgomery Blair High School; Executive Committee Chair for the 13th International Symposium on Laser Precision Microfabrication; Program Committee member, SPIE Photonics West, Laser Applications in Micro-electronic and Optoelectronic Manufacturing (LAMOM) XVIII.

Nieh, S., Ph.D., organized and led a out-of-class field trip/tour of ~24 students and faculty to Dickerson Utility Power Generating Station of Southern Maryland (A large Power Plant providing electricity to 2 million residents in mid-Atlantic region).

Nguyen, C.C., D.Sc., dean, offered a short course in the area of intelligent systems to students from Fu Jen Catholic University, Taiwan, June – July, 2011; traveled to Honolulu, Hawaii, in July 2011 and worked with the University of Hawaii-Manoa on a project developing teaching materials for the natural science portion of a course entitled Philosophy of Science to be taught to Vietnamese students planning to study abroad in the United States; from Aug. 7 to 18, 2011, traveled with Provost Brennan to visit several universities and research centers in Macau, Hong Kong, and Vietnam, signing memoranda of agreement (MOU) with the above organizations; hosted Rev. Benny Thomas, director of engineering and law faculties at Christ University, Bangalore, India, in November 2011 to follow up his visit there in 2010; hosted Dr. Richardo Alencar, deputy associate vice-president for academic affairs at Pontifical Catholic University of Rio de Janeiro in February 2012 to discuss potential collaboration and educational programs; visited St. Vincent College, Latrobe, Pa., in March 2012 with Assistant Dean Binh Tran to meet with its key administrators and prospective students for the 3+2 program between the college and the CUA School of Engineering; in April 2012 hosted a delegation from Fu Jen Catholic University including its newly elected president and its dean of engineering. During the visit, the delegation met with CUA President Garvey and Provost Brennan. Subsequently he and the provost signed an agreement with Fu Jen Catholic University for several educational programs between the two universities; from May 14 to May 21, 2012, traveled with J.L. Abot, Hsien Ping Pao, and Duillia de Mello (physics) to several universities and research organizations in Brazil, including the Pontifical Catholic University of Rio de Janeiro (PUC-RIO), the Federal University of Rio de Janeiro in Rio de Janeiro, the Technological Institute of Aeronautics in Sao Jose dos Campos, the National Institute for Space Research in Sao Jose dos Campos, and the Universidade Cruzeiro do Sul in Sao Paulo. During the above visits, the delegation met with key administrators of these organizations and discussed potential collaboration and establishment of educational programs; on May 26, 2012, went to Len Duong Camp, Minn., organized by the Vietnamese Culture and Science Association (VCSA) and served as a panel member for a career workshop.

Pan, T., Ph.D., has served as a member of the following Transportation Research Board (TRB) committees: AHD40: Polymer Concretes, Adhesives, and Sealers; AFN20: Properties of Concrete; AHD45: Corrosion; AFP60: Engineering Properties of Unsaturated Soils; member, American Society of Civil Engineers (ASCE); Geo-Institute Pavements Committee, T&D Highway Pavement Committee; faculty adviser for ASCE Concrete Canoe National Competition, 2012.


Sun, L., Ph.D., reviewer of the following journals: Journal of Transportation Research Board, ASCE Journal of Transportation Engineering, ASCE Journal of Infrastructure Engineering, Shock & Vibration, Journal of Traffic and Transportation Engineering, School of Engineering Undergraduate Committee Chair.

Tran, B.Q., Ph.D., reviewer of the IEEE Transactions on Information Technology in Biomedicine and IEEE Transactions on
Biomedical Engineering, NIH grant review panels AIDS Clinical Studies and Epidemiology Study Section and NIBIB’s 2012/10 Council ZRG1 SBIB-V 58 R review of Technologies for Health Independent Living in 2012; chaired the 4th Annual Engineering Senior Design Day on April 30, 2012, at The Catholic University of America; co-director with Otto Wilson, Ph.D., of the Sloan Foundation Minority Doctoral Program at CUA.

- **Vignola, J.F.**, Ph.D., Acoustics Alumni Meeting, Nov. 12, in association with the DC Chapter of the Acoustical Society; Acoustics Demonstrations night, in association with the DC Chapter of the Acoustical Society.

- **Yang, Y.**, Ph.D., adviser for Society of Women Engineers since 2011; Editorial Board Member of International Journal of Security (IJS) and Technical Program Committee member of PETSE 2011, CollaborateCom 2011, DASC 2011, COLLA 2012, CollaborateCom 2012.

*Student award winners at 2012 year-end luncheon in May.*
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