Magnification of an optical digital camera developed by engineering faculty inspired by the way an insect’s eye works. Story on page 12.
New Faculty and Staff

Cara Clark, B.A.
Cara Clark, B.A., joined the Office of the Dean, in October 2006 as the new assistant to the dean for project management. Clark received a bachelor of arts in liberal studies from California State University, Chico. She brings to the school extensive experience in budget and project management from her previous employment at the Children’s Museum of Richmond, a nonprofit agency where from 2002 to 2006 she oversaw the administration of special events and summer camp programs.

Angela McRae
Angela McRae joined the Office of the Dean, in December 2006 as the receptionist, a newly created position in the school. McRae attended Archbishop Carroll High School and has pursued a bachelor’s degree in interdisciplinary studies at CUA since January 2007. In 2006 she worked as a leasing agent for the Residents at the Congressional Village in Rockville, Md. and as a dental assistant/receptionist at Friendship Endodontics in Friendship Heights, Md.

George P. Mavroeidis, Ph.D.
George P. Mavroeidis, Ph.D., joins the Department of Civil Engineering as an assistant professor in September 2007. He received a Diploma degree in Civil Engineering from the National Technical University of Athens (Greece) in 1997, an EMS degree from Rensselaer Polytechnic Institute in 1998 and a Ph.D. degree from the State University of New York at Buffalo (SUNY/Buffalo) in 2004. He was postdoctoral researcher at SUNY/Buffalo, at the Institute of Engineering Seismology and Earthquake Engineering in Greece and at the University of California, San Diego. His research interests lie in the areas of earthquake engineering and engineering seismology.

Baohong Yuan, Ph.D.
Baohong Yuan, Ph.D., joins CUA as an assistant professor of biomedical engineering in September 2007. He received his bachelor’s degree in engineering in 1997 and his Ph.D. degree in applied physics in 2002, both from the Harbin Institute of Technology, China. He then pursued his doctoral study at the University of Connecticut, Storrs, Conn. where he earned his Ph.D. degree in biomedical engineering in June 2006. He was a postdoctoral researcher at Columbia University and a recipient of a pre-doctoral training grant from the Department of Defense. His main research areas include optical tomography, spectroscopy and microscopy.

Lin-Ching Chang, D.Sc.
Lin-Ching Chang, D.Sc., joins the Department of Electrical Engineering and Computer Science in September 2007 as an assistant professor. She received her B.Sc. degree in information and computer engineering from Chung Yuan Christian University, Taiwan, in 1991, and the M.Sc. and D.Sc. degrees in computer science from George Washington University, in 1993 and 1998, respectively. She was an Intramural Research Training Award Fellow at the NIH from 2003 to 2007. Prior to joining NIH, she was a senior software engineer at 3Com Corporation. Her research interests include medical image processing, pattern recognition, combinatorial design, information retrieval, database system and messaging systems for telecommunication applications.
Dean’s Message

I am very pleased to communicate with you again in this second issue of CUA Engineer. After launching the inaugural issue of the CUA Engineer last year, our school has received many compliments from its readers including our faculty, staff, and alumni and also from administrators of engineering schools around the country. We would like to thank you for your support and hope to continue to enhance both the size and the quality of this publication to meet your expectation.

Like the previous year, 2006–2007 has been an exciting one filled with activities. We continued to expand our academic programs and research collaboration with universities in Asia. Highlights of the academic year 2006–2007 are presented as follows.

- In the fall semester of 2006, the school welcomed 86 new undergraduate students including nine transfer students, representing an 83 percent increase in new undergraduate students as compared to last year. The graduate enrollment has been steady in the last three years. At the school diploma distribution ceremony in May 2007, the school granted 40 bachelor’s degrees, 79 master’s degrees and three doctoral degrees to the graduates. The names of the graduates are listed on the back page of this issue.

- Our faculty continued to be very active in research in terms of research proposal submission, journal publication and conference participation. The number of published papers and submitted proposals increased substantially from last year, as reported in the faculty section of this issue. Two members of our faculty received the prestigious National Science Foundation CAREER awards for their research. In addition, two engineering faculty members received the 2007 CUA provost’s awards for excellence in teaching and research, respectively. See the articles in this issue for more information about the above award recipients.


- The school continued to carry out activities for the maintenance of the ABET accreditation and has actively prepared for the upcoming re-accreditation visit in October 2007. The engineering chairs will submit their self-study reports to ABET by July 1, 2007, and will start finalizing the details for the visit. After registering for the Fundamental Examination (FE) in June 2006, the engineering juniors took the exam in October 2006. The exam results that I received from NCEES in April 2007 showed some score improvement as compared to last year. The FE results have been incorporated into the outcome assessment of our engineering programs.

- Three new faculty members—an assistant professor of electrical engineering and computer science, an assistant professor of civil engineering and an assistant professor of biomedical engineering—join our school in September 2007. Two new staff members joined the school to fill the newly created receptionist position and the vacant position of the assistant to the dean for project management. Please read the new faculty and staff section for more details.

- I am happy to inform you that a new faculty fellowship program was established thanks to a generous donation made by the Burns family, four of whose members graduated from our school. This fellowship, named the Burns Faculty Fellowship, will be awarded annually to junior engineering faculty members to support their research activities. Please read the related article in this issue to learn more about the Burns family and this new fellowship program.

- For 11 days in October 2006, I visited five major cities of China and several major Chinese universities including Tsinghua University, Peking University, Southeast University, Yangzhou University, the Hong Kong University of Science and Technology and the Hong Kong Polytechnic University (PolyU). During the trip, we signed memoranda of understanding with the above universities for potential collaborative educational programs and faculty research collaboration. For more information about the above trip and the established student exchange program, please read the related stories in this issue.

- During a 10-day trip in March 2007, I traveled to Singapore and Malaysia to visit The National University of Singapore and the Nanyang University of Singapore and three campuses of the INTI College in Malaysia. See related stories for more details.

- In April 2007 the school signed a MOU with the International University of the Vietnam National University-Ho Chi Minh City in Ho Chi Minh City, Vietnam, for CUA and HCMU to start exploring 2+2 and 4+1 degree programs. CUA requested and received approval from the CUA Academic Senate Undergraduate Board to establish the 2+2 programs with the above university partners. See related article for more details.

- The off-campus master’s degree programs, including the Engineering Management Program and the on-site programs at NIH and NSWC-Carderock, are going strong with good enrollment. Recently the school won a proposal for an on-site graduate program at the Department of the Army-Fort Belvoir and will start offering courses there in the fall semester of 2007.

As presented above, the school has done very well in the academic year 2006–2007 in all aspects including enrollment, research, fundraising and program development and we are very proud of its success. I am happy to witness the seeds we planted in the educational programs in Asia in the last several years began to germinate into some concrete educational programs and international collaboration as the school moves into a new era of engineering education aiming at producing global leaders. I hope you will enjoy reading this second issue of CUA Engineer and as always I look forward to receiving your feedback.

Charles Cuong Nguyen
Dean, School of Engineering
nguyen@cua.edu
Lasering in on Differences

Given that Assistant Professor of Mechanical Engineering John Judge has three children under the age of five, it’s fitting that when describing his research, he channels Sesame Street and its classic line: “One of these things is not like the others.”

In fact, Judge has spent his research career looking for things that are not as they appear — specifically for that one thing that is not like the others, even if the differences are hidden to the naked eye. Judge finds those subtle differences — often in micromechanical systems that could fit on the head of a pin — by looking at vibration.

Judge, who received both the 2007 provost’s teaching award and the Burns Faculty Fellowship, says his research focuses on how small differences in the shape or size of one part of a micromechanical system, when all parts are ostensibly identical, can translate into huge differences in the system’s vibration behavior. Understanding these effects is crucial for developing new uses for micro- and nanotechnology, such as tiny, ultrafast mechanical resonators for filtering and processing electrical signals, or ultra-sensitive arrays of sensors for chemical and biological agents.

These days, Judge is using vibration to spot pieces of earth that are not like the others — plots that may be hiding land mines or improvised explosive devices, roadside bombs that have been a major weapon of insurgents in Iraq. He and a colleague, Assistant Professor of Mechanical Engineering Joe Vignola, have created a five-axis laser that detects subtle changes in vibration. Its beam projects down onto a section of ground, and sends a reading to a computer indicating any abnormal vibration.

“You look at the ground and it all looks identical to the naked eye,” Judge says. “But if you measure how the ground vibrates, the land right above a landmine vibrates differently from undisturbed ground.” In addition to military applications, the technology could aid humanitarian efforts as a land mine detector in places like Vietnam, where villagers and children are still being killed or maimed by long-forgotten land mines.

Other laser systems currently in development require up to three lasers to gain an accurate reading of a target. Judge’s laser boasts both accuracy and versatility — operating on three moving axes so that one laser can assess an area, moving up and down, front to back, and left to right. Two rotational axes allow a mirror to further direct the laser’s beam, so measurements can be made from any angle. It’s like having three lasers for the price of one. Given that vibration-detection lasers can run $200,000 per machine, that’s a serious cost benefit.

Judge and Vignola are also working on adding a telescope lens to a laser, to allow it to measure vibration from up to 100 meters away. It could provide lifesaving technology for armed forces in Iraq and Afghanistan, where a significant number of fatalities are the result of hidden roadside bombs. “There’s a rock by the side of the road, but is it really a rock or is it an IED disguised as a rock?” Judge asks. In Judge’s vision, a soldier could point the laser at the object from a safe distance and find the answer — before his convoy is on top of it.

Sometimes, being “not like the others” has its benefits. Luckily, Judge knows when to be different.
When most people pick up a cell phone, they’re not thinking about the other 160 million users in the United States sharing the air space. They’re just trying to make a call.

Lucky for them, CUA electrical engineering professor Phil Regalia is not most people.

“Everyone has to learn to peaceably coexist in the same radio spectrum,” Regalia says of the ever-expanding, wireless-phone market. And it’s an edict easier said than done.

For an increasingly contentious band of rival networks, getting their piece of the airwave pie has become a game of “who can shout the loudest.”

“It’s sort of like being in a crowded room of reporters, where you’re trying to ask questions at the microphone,” Regalia explains. “There is all this commotion — everyone’s talking at once — and then one person gets to speak again and everyone else eventually quiets down.”

For years, cell phone providers have all broadcast simultaneously, sharing the same radio frequency, through a technique called “code division multiple access,” based on assigning separate signature codes to each user, until a maximum number of distinguishable codes are allotted.

But the United States and nations across the world are rapidly reaching a point of frequency saturation, as the number of these wireless devices keeps expanding.

“Pretty soon, everything will be wireless so the issue of getting that many wireless transmitters to function simultaneously is a big, open problem,” Regalia says. “There’s not going to be enough periods of silence left.”

In other words, the shouting match has left everyone short of breath. That means it won’t be enough for networks to simply cooperate “peaceably,” they’re going to have to be smarter about the ways they share their resources.

The National Science Foundation seems to agree: It recently provided Regalia with a three-year, $120,000 grant to study more intelligent ways to share the radio resource spectrum of these high-occupancy channels.

Currently, each network user is “taught” to send its signals in between or around other users’ signals, so they can transmit simultaneously. But these simultaneous signals are treated as interference, and this lowers the usable data rate, or how much information can be sent.

The professor likens this to a “wifi” hotspot, like the local Starbucks, where too many customers are trying to use the Internet on their laptops at once, slowing down the whole system.

Regalia’s research focuses instead on how the wave forms are behaving, so that networks can understand the behavior and make more intelligent choices such that a message passes through as though there were no interference. The basic technique was first discovered in the 1980s and dubbed “dirty paper coding,” based on the analogy of finding the remaining white space on paper that already has writing, or is “dirty.” In this way, existing messages on the paper need not impede the paper from carrying additional messages. The method lay dormant for many years since its successful application is dependent on resolving many technical problems in coding and radio modulation, whose solutions are the goal of Professor Regalia’s research.

While he acknowledges the problem of shrinking capacity, Regalia takes comfort in the notion that necessity is the mother of invention. And he’s hard at work to ensure she provides some offspring.
Beginning January 2008, CUA engineering students with an interest in the global classroom will get a chance to pack their bags—and their T-squares—to participate in a rite of passage so often elusive to undergraduate engineers: a semester abroad.

Historically, juniors in the CUA School of Engineering resigned themselves to trading in a study abroad program for a semester in Pangborn Hall in an engineering classroom. Like nursing programs and other academic pursuits that require specific, intensive science and math courses, engineering requirements made it difficult, if not impossible, for CUA engineering students to experience life, culture and academics in another country. However thanks to a memorandum of understanding that the school signed with the Hong Kong Polytechnic University in 2006, on Jan. 16, 2007 Dean Nguyen and CUA Provost John Convey and Alex Wai, Ph.D., dean of the Faculty of Engineering of PolyU signed an agreement to establish a student exchange program between the two institutions.

Under this program, qualified engineering students at CUA may study abroad at PolyU during the second semester of their junior year. The CUA engineering programs—biomedical, civil, electrical and mechanical engineering and computer science—have developed modified curricula for their study abroad students to ensure that they can graduate on time. In particular, courses approved against the modified curricula and taken by the study abroad students can be transferred to the CUA degree programs. Since participating students will pay full-time tuition at CUA for the study abroad and will not pay tuition at PolyU, there will be no change in their existing financial aid arrangement in terms of their federal and CUA grants and scholarships. The study abroad program is also financially attractive because the monthly expense including room and board at PolyU is about $660 as compared to that of $1,100 at CUA. Students from PolyU can come to study at CUA under similar arrangements to the CUA students. Language is not a barrier because all courses are in English at PolyU as Hong Kong was under the English influence for many years.

PolyU is a public university with 12,000 students and excellent instructional and research facilities. Hong Kong, where PolyU is located, is a very dynamic and prosperous metropolitan city with fabulous sightseeing attractions and international cuisine.

“This study abroad program was established to effectively deal with the impact of globalization on future engineering workforces. Students participating in this program will gain global knowledge that will undoubtedly enhance their job market value when they graduate. The combination of a solid engineering education at CUA and a semester abroad at an application-oriented institution like PolyU with excellent laboratory facilities will provide the participating students with a unique engineering education,” says Dean Nguyen.
School of Engineering Explores Research and Educational Opportunities in China, Singapore and Malaysia

Dean Nguyen has traveled extensively throughout Asia over the last two years visiting more than five Asian countries, forging relationships with university presidents and faculty and crafting memoranda of understanding (MOU) with major engineering institutions. The established relations would include semester-abroad options and dual-attendance programs such as a 2+2 bachelor program, with two years of study at CUA and two years at a partner school. As a result of last year’s trip to Asia, a proposal for the establishment of 2+2 programs with two universities in Vietnam and Taiwan was recently approved by the Undergraduate Board of the CUA Academic Senate. Nguyen is also working to establish another option known as a 4+1 bachelor’s/master’s program, enabling a student to simultaneously receive a bachelor’s degree at one university and a master’s degree at the partnering university. The partnership will also encourage faculty collaborations between schools, including sabbatical leaves and joint authorship of research papers.

These partnerships will provide a mechanism, allowing for the best and brightest Asian students to attend CUA for a semester in the semester-abroad option or two years in the 2+2 programs—and hopefully entice them to return for graduate school. Drawing qualified graduate students from other countries to pursue master’s and doctoral (Ph.D.) degrees at CUA is a long-term objective of these programs, according to Dean Nguyen, who says there is a shortage of qualified graduate students to fill these degree programs. And given that approximately 70 percent of the faculty members at these partner universities earned their advanced degrees at major U.S. universities, says Nguyen, it makes sense to advertise CUA as a top choice for foreign engineers looking to continue their education in the United States.

Last fall, the dean’s city-hopping schedule packed six universities in four cities into just 11 days. The trip began in Beijing at what Nguyen refers to as the “Harvard and MIT of China,” Tsinghua University and Peking University, where the country’s prestigious engineering schools are located. Accompanied by Professor Frank Pao, the engineering school’s director of development of international engineering programs, Nguyen then traveled from Beijing to Hong Kong, stopping along the way in Nanjing, Yangzhou and Shanghai. During the fall semester of his trip, he visited Southeast University, Yangzhou University, the Hong Kong University of Science and Technology and the Hong Kong Polytechnic University. At each institution, the dean met with university presidents, as well as deans and engineering professors, offering presentations about CUA, its academic programs and partnership opportunities to each school. At a result of this trip, the dean signed memoranda of understanding (MOU) with Southeast University and Hong Kong Polytechnic University to explore educational and research opportunities between the institutions.

Continuing to expand the scope of the CUA international programs, the dean traveled to universities in Singapore and Malaysia during the spring semester. In Singapore, he visited the National University of Singapore and the Nanyang University of Singapore, and in Malaysia, three campuses of the INTI College. As a result of this trip, the School of Engineering signed a MOU with the INTI College to explore the development of 2+2 and 4+1 programs with this college. The dean is exploring a student exchange program with Nanyang University of Singapore.

Dean Nguyen says he plans to ease his globetrotting travels after a visit to schools in Bangalore, India, sometime in the next year. His choice of partnering countries and universities is strategic and follows one hotly debated business trend: outsourcing. Asian countries, along with India, have become the major recipient of a diffusion of engineering work as more American companies shift production overseas.

“We need to look to the future and prepare for that,” Nguyen says. “We’re going to train our students to not only become competent engineers, but also to have great potential to become managers and leaders in the engineering global market.” He is confident that a CUA student who boasts engineering-abroad studies in China, Vietnam or another foreign country will make them a more attractive candidate in the professional world.

And one CUA engineering professor, in particular, may take some pride in the dean’s most recent pick of partnering schools: Associate Professor of Civil Engineering Lu Sun is a graduate of one of the engineering school’s latest partners, Southeast University in Nanjing, China.
Collaborative 2+2 Programs Approved for Taiwan and Vietnam

In May 2007, the undergraduate board of the CUA Academic Senate approved a proposal submitted by the School of Engineering, SOE, to establish 2+2 programs with two universities in Asia: The Fu Jen Catholic University, FJCU, in Taiwan and the International University of the Vietnam National University-Ho Chi Minh City, HCMIU, in Vietnam. The approved 2+2 programs with the two Asian universities will enable the SOE to accept Asian students who complete the first two years at their home institutions and intend to complete the last two years at the SOE in a degree program.

The establishment of the 2+2 programs is the result of the following up of a memorandum of understanding, MOU, that the SOE signed with the FJCU during Dean Nguyen’s trip to Taiwan last year and an MOU with the HCMIU in April 2007.

Students from FJCU and HCMIU who wish to be admitted to the 2+2 programs must successfully pass two evaluation stages, the first with the CUA Office of Undergraduate Admissions (OUA) and the second with the SOE. They must apply to OUA as international transfer students. Their admissibility to CUA will be first evaluated by the admission criteria set by OUA for transfer and international students, which may include GPA, equivalent SAT scores and English proficiency. After the students meet the standards of the OUA as general international transfer applicants, their credentials will be further evaluated by the SOE. This second evaluation may consider letters of recommendation from former teachers, knowledge of relevant technical subjects and prospects for success at the School of Engineering. The students will not be officially admitted to the proposed 2+2 program until they are approved by both OUA and the SOE.

These 2+2 programs are the first-ever international programs established at the SOE. Dean Charles Nguyen reacted enthusiastically to the Undergraduate Board’s approval of the 2+2 programs. “These programs will not only enhance the diversity and internationality of our school, but also potentially help resolve the shortage of qualified graduate students and research assistants. We hope to encourage the participating students to continue their graduate studies with us after they finish.” The SOE expects to welcome the first group of students from Vietnam in September 2007.

Engineering Faculty Earn Nearly $2 Million in Grants

This past academic year, five members of the CUA engineering school were awarded significant grants from the National Science Foundation and the U.S. Department of Veterans Affairs’ Rehabilitation Research and Development Service totaling almost $2 million.

The awards include two NSF Faculty Early Career Development, CAREER, Program awards and an Early Career Award from the Wallace H. Coulter Foundation. The NSF CAREER award seeks to honor young scientists whose activities best integrate the realms of research and education, building the basis for long-term contributions to their fields. It is considered the foundation’s most prestigious award in early career development.

“The School of Engineering is thrilled to have three members of our faculty distinguished for their work at such an early age in their careers,” said Dean Nguyen. “They have joined a team of cutting-edge scientists, as evidenced by other grants recently awarded to their colleagues.”

Lu Sun, associate professor of civil engineering, has been awarded a five-year, $410,000 NSF CAREER award to study the effects of vehicle traffic on highway design. Otto Wilson, assistant professor of biomedical engineering, has been awarded a five-year, $450,000 NSF CAREER award, titled “Bone Inspiration in Research and Education.” Wilson will use the unique structure and function of bone to develop materials to stimulate bone healing and modeling at the whole tissue, cell and molecular levels.

Assistant Professor of Biomedical Engineering Jessica Ramella-Roman has been awarded a $230,000 Early Career Award from the Wallace H. Coulter Foundation that will fund two years of research related to measuring oxygen levels in the retina of diabetes patients.

Two other engineering faculty members, Phillip Regalia, professor of electrical engineering and computer science, and Peter Lum, assistant professor of biomedical engineering, recently received separate grants from the NSF and Veterans Affairs, respectively, totaling almost $700,000.

Regalia has been awarded an NSF award for research totaling $120,000. The three-year grant, titled “MUCHO: Two problems in Multi-User Communications for High Occupancy channels,” will study the specific problems created by the overcrowding of modern wireless devices sharing limited wavelengths.

Lum has been awarded a three-year, $562,000 grant from the Department of Veterans Affairs’ Rehabilitation Research and Development Service to further develop neurorehabilitation abilities in stroke victims. The grant, titled “Extension of the MIME robotic system for stroke rehabilitation,” will work to improve arm function following a stroke.
Burns Faculty Fellowship Established to Support Junior Faculty

A new faculty fellowship has been established through a generous donation of the Burns family — four of whom are graduates of the CUA School of Engineering: Robert Burns (BME ’51) and his three sons Matt (BEE ’80), Mark (BEE ’82) and John (BEE ’85). This new faculty fellowship program is the latest addition to the school’s faculty awards that aim to recognize and support excellent faculty. In 2001 the school established the Kaman’s faculty excellence awards from an endowment of Charles H Kaman (B.A.E. ’40).

Sixty years ago, in 1947, Bob Burns returned home from serving in World War II, and enrolled in engineering classes at CUA on the GI Bill. He graduated with a Bachelor of Mechanical Engineering degree in 1951 and worked for an engineering firm in Washington, D.C. He helped the firm open a branch office in Philadelphia, where it was working on a project for the local airport. When the project was completed, Burns stayed to start his own firm in Philadelphia.

Years later, when he began discussing college with his sons, Burns told them they could go to college anywhere they wanted — as long as it was Catholic University. Today their family business, the Burns Group, is a multi-disciplinary engineering and design-build firm in Philadelphia with expertise in aviation and transit.

The Burns family has been loyal to CUA during the last 60 years. Bob Burns served on the Alumni Association’s Board of Governors and chaired a donor recognition society for the Annual Fund in the early 1980s. The family members have been generous annual donors to the university. In March 2007, the family announced its desire to establish an endowment for a faculty fellowship program at CUA to support the research of junior faculty of the School of Engineering. In April 2007, Dean Nguyen, accompanied by Mark Roberts, development director, visited the Burns family at the Burns Group’s headquarters in Philadelphia where they met Bob, Betty and Matt Burns and one of the dean’s former students, John Burns, who received an electrical engineering degree in 1985. At the visit, the dean thanked the family members for their generous donation. Later the family members attended the 2007 diploma distribution ceremony at the School of Engineering where the dean formally announced the inaugural of the Burns Faculty Fellowship program and gave the family an appreciation plaque. At a diploma distribution ceremony that spring, Matt Burns presented award plaques to the inaugural Burns Fellows, John Judge and Zhaoyang Wang, who both are assistant professor of mechanical engineering.

To be named a Burns Fellow, faculty members must submit a proposal outlining their research plan, and be chosen by a selection committee consisting of the members of the school’s executive committee. The payout of the endowment will be used to subsidize the expenses of the research activities of the Burns Fellows. The school expects to award up to two Burns fellowships every academic year.

Didion Honored with 2006 Engineering Distinguished Alumni Award

Engineering alumnus David Didion, B.M.E. ’63, M.M.E. ’63, D.Engr.’72, received the 2006 Engineering Distinguished Alumni Award and was honored at a Homecoming luncheon sponsored by the School of Engineering in October 2006.

Established by the School of Engineering in 2004, this award has been used to annually honor worthy engineering alumni for their achievements and contributions in their fields. Nominations for this award can be made by faculty, students and staff to the school executive committee that makes the selection and recommendation to the dean for his final approval.

Dean Nguyen presented Didion with a plaque signifying the award at the luncheon attended by about 90 alumni, faculty, staff, students and CUA administrators. After accepting the plaque, Didion gave a speech summarizing his experience with the faculty of the School of Engineering and how his CUA education has shaped his principles and career. Describing his reaction to learning of the honor, he said “This is the best phone call I received from the dean’s office.”

Didion received his bachelor, master’s and Doctor of Engineering degrees from CUA, and then served on CUA’s engineering faculty from 1962 to 1971, before joining the National Institute of Standards and Technology in 1971. He was named a NIST Fellow in 1995 and retired from full-time service in 2002. He presently serves on the CUA Mechanical Engineering Advisory Board.

A private engineering consultant, Didion also teaches mechanical engineering courses for the part-time Master’s degree programs at Johns Hopkins University and at the University of Maryland. He is a recipient of numerous awards, including the Hall Gold Award from the U.K. Institute of Refrigeration and the first Gustav Lorentzen Award from the International Institute of Refrigeration. He is a Fellow of the American Society of Mechanical Engineering and the American Society of Heating, Refrigerating and Air Conditioning Engineers. Didion serves on or chairs numerous technical committees within ASHRAE and IIR. He is a past United States editor of the International Journal of Refrigeration.
Dean Nguyen: Honored for Editorial Work and Recognized with Numerous Awards for Community Services

Dean Nguyen, received numerous awards during the 2006–07 academic year for his editorial service for a journal he founded and for his community services.

In July 2006 the World Automation Congress, WAC, gave Dean Nguyen the Tenth Anniversary Award of the International Journal of Intelligent Automation and Soft Computing, AutoSoft, the WAC official journal, in Budapest, Hungary. The dean was honored with this award for his service to the journal as its founder (1996), editor-in-chief for eight years (1996–2004), founding editor and chair of the AutoSoft advisory board since 2004.

In August 2006, in Westminster, Calif. at the annual “Writing for America Contest” sponsored by the local community, Dean Nguyen received a Member Resolution No. 2580 from the California Legislature Assembly for his “dedication and contributions in the area of education to the people of the State of California.” He also received a Certificate of Special Congressional Recognition jointly from Viet Bao Newspaper and Congresswoman Loretta Sanchez for “outstanding achievements, wonderful service and exemplary contributions to the community of California,” as stated in the certificate.

In November 2006, while in Beijing, Dean Nguyen received a phone call from the president of the Vietnamese American Medical Research Foundation, VAMRF, informing him that the award selection committee of the foundation decided to grant the dean the 2006 Excellence in Community Service Award. VAMRF, a research-oriented foundation annually selects two people from a nomination pool to receive the foundation awards. They are traditionally given to the recipients on the second day of the lunar calendar, i.e. the day after the Lunar New Year. Dean Nguyen went to Garden Grove, Calif. and accepted the award on Feb. 19, 2007, the second day of the 2007 Lunar Calendar.

Asked what he thinks about the awards he received, Dean Nguyen said, “When providing the services to various communities, I never expected to receive any awards and recognition, but I am humbly honored to receive them. I hope these awards will enhance the visibility of CUA and the School of Engineering.”

Army Night Vision
Off-Campus Master’s Program

The departments of electrical and mechanical engineering have teamed up to offer an off-campus graduate program at the Army Night Vision Laboratory, NVL, at Fort Belvoir, Va. Beginning fall 2007, CUA is offering two courses per semester at NVL leading to M.S. degrees in either electrical engineering or mechanical engineering. CUA was awarded this program after submitting the winning proposal in a competition that included a number of local universities. This new program, combined with an existing off-campus program at the Naval Surface Warfare Center, NSWC, Carderock Division, establish a strong CUA presence in two of the United States most prestigious federal laboratories.

State assembly woman Lynn Daucher and Dean Nguyen at the resolution presentation ceremony

Dean Nguyen and Imre Rudas, President of the Budapest Technology University, at the WAC award reception
Excellent Engineering Faculty Honored with 2007 Kaman Awards

Sen Nieh, Ph.D., professor of mechanical engineering, and Phillip Regalia, Ph.D., professor of electrical engineering and computer science were honored as the recipients of the 2007 Kaman Award for Faculty Excellence. They were recognized at the annual year-end luncheon and at the 2007 diploma distribution ceremony, where each received an award plaque. In addition, each award recipient received a monetary gift.

Nieh received the 2007 Kaman Award for Faculty Excellence in Teaching. He was nominated by several of his students. In the spring semester of 2007, Nieh taught three graduate level courses for graduating seniors in mechanical engineering. One student wrote in his nomination, “Dr. Nieh is extremely passionate about his teaching.” Wrote another student, “His ability to take sprawling mathematical formulas and break them into simple and comprehensive examples makes even the most demanding subjects enjoyable. His self sacrifice and concern for each student’s learning prove that he is deserving of the award.” Based on all submitted nominations, Nieh received the highest average course evaluations scores with 9.5/10 for overall teacher and 8.6/10 for the overall course.

Regalia was selected as the recipient of the 2007 Kaman Award for Faculty Excellence in Research. During the academic year 2006–2007, Regalia submitted five research proposals to NSF and NIH and received a major grant from NSF to support his research in multi-user communications for high occupancy channels. He published two papers in *IEEE Transactions* and one in *Proceedings of the IEEE*. He also published four conference papers and several book chapters. He advised two doctoral students and served as the faculty adviser of one doctoral student. Regalia was a co-recipient of the 2006 Kaman Award for Faculty Excellence in Teaching. He is an IEEE Fellow and editor-in-chief of EURSAIP *J. Wireless Communications and Networking*.

Two Engineering Professors Receive CUA’s Top Faculty Awards From Provost

Engineering professors John Judge and Lu Sun were among five CUA faculty to receive Provost Awards in May 2007. Judge won an award for excellence in teaching during the preceding year; Lu Sun won for excellence in research during the preceding year. The awards come with a cash prize of $2,500.

Judge, assistant professor of mechanical engineering, has been nominated for this award for two consecutive years, indicating the esteem with which his colleagues and students view his teaching. Students have indicated that he is always prepared for class, knows his material well, and — most significantly — is able to explain complex technical ideas in a way that is easily understood.

Sun, an associate professor of civil engineering who specializes in transportation engineering, frequently has presented papers and invited lectures in the United States and abroad. In 2006, he saw the publication of five articles and the acceptance of two others in some of the most important journals in his field. He has attracted about $1.7 million in sponsored funding, including a recent CAREER award from the National Science Foundation.
Checkups Via Cyberspace

For low-income patients, gaining access to medical care can be difficult, but for low-income seniors, just getting to that place of service is often the hardest part.

That’s why collaboration between the biomedical engineering department and the nursing school is bringing a nurse to their homes — virtually — and changing the face of health care.

Through a grant from the Department of Commerce, biomedical engineering department chair Binh Tran and Associate Professor of Nursing Kathy Buckley have spent the last two years shaping the idea of telehealth. Taking 25 patients at a time, they focused on seniors at the Edgewood Community who suffered from diabetes and high blood pressure. They provided seniors with a blood pressure cuff, a weight scale and glucometer — all hooked up to a computer box that attached to the phone line, and by extension, their very own nursing staff. Patients take measurements every day that are automatically uploaded to a CUA server, where nurses can examine the data for any irregularities. On a weekly basis, nursing students gather patient’s data and make a “virtual house call” through a video phone.

“The goal is to teach these patients to manage themselves and change their habits,” Tran says. The daily measurements and video phone interaction provide constant feedback that keeps patients motivated. And for seniors who often have no easy access to transportation and then, in many cases, spend hours sitting in a waiting room, having a virtual phone call is “almost like having a nurse on call,” Tran says, noting that if a patient calls with a question or problem, the nursing staff will respond within 24 hours.

Patients enrolled in the program have their virtual nursing staff for three months before a new group of patients come into the program. The hope is that after 90 days, patients can monitor themselves.

Tran expects this telehealth system eventually to be the working model for larger outpatient care facilities that are able to serve large numbers of seniors at one time.

A Special Gathering Place: School of Engineering’s Alumni Garden Opens in Spring 2008

Alumni, faculty and students will join Dean Nguyen and senior university officials May 2008 to dedicate the School of Engineering’s Alumni Garden. The garden is located on the exterior ground level of Pangborn Hall. “The Alumni Garden will be a special gathering place for our Engineering community. We envision an outdoor café, where students and faculty can relax or study between classes,” said Dean Nguyen. “We will have wireless Internet access, music playing through speakers in the background, and lighted walkways.”

Crews began work last spring on the brick walkways and stone walls. New landscaping with trees and shrubs was planted. Wrought-iron tables and chairs were added this summer. Renovations will be completed in early fall.

“The Alumni Garden will be a constant reminder to our students that great things are ahead of them,” Dean Nguyen said. “Our alumni are at the top of their fields. Some have become the ambassador to a foreign country, CEO of an international firm, a United States Navy Admiral, president of a university, and excellent faculty at other universities. We have named this garden in honor of our alumni to celebrate their accomplishments.”

The School of Engineering will inscribe the names of selected alumni and faculty on the stone walls of the garden. Parents will also be able to honor their son or daughter’s graduation by adding their child’s name to the “Wall of Achievement.”

This is the latest capital improvement to Pangborn Hall, home to the engineering school since 1961. In 2003 Very Reverend David M. Connell, C.M., university president, dedicated a newly renovated Anthony J. Scullen Room, named for a former dean. The Scullen Room is used for conferences, seminars and special events.
Professors Offer Hope for Spinal Cord Patients

CUA assistant professors of biomedical engineering Jessica Ramella-Roman and Joseph Hidler have received a $150,000 grant from the Christopher and Dana Reeve Foundation to conduct medical research in the care of persons with spinal injuries.

Complications from pressure sores — one of the biggest problems facing spinal cord injury victims — led to the 2004 death of actor Christopher Reeve, who suffered a spinal cord injury in 1995. One of the factors that Ramella-Roman and Hidler believe leads to pressure sores is a condition called autonomic dysreflexia, which often occurs in individuals with spinal cord injuries in their upper back or neck.

Since the lower extremities can no longer communicate with the brain due to the injury, the body’s natural neurological response incorrectly responds to any stressful stimulation — even the need to urinate — by constricting the blood vessels in parts of the body below the injury site. Because blood flow is reduced, less oxygen reaches soft tissues such as the skin, ultimately leading to pressure sores.

To investigate this phenomenon, Ramella-Roman has invented a novel fiber-optics-based sensor that measures the oxygen levels in soft tissue up to a centimeter under the skin. She and Hidler will use the device on a group of spinal cord-injured subjects to measure the extent to which autonomic dysreflexia is causing changes in skin oxygen levels and thus making the patients’ skin more susceptible to pressure sores.

The two professors’ previous research on one patient in whom they artificially induced a single episode of autonomic dysreflexia found that oxygen levels dropped by as much as 40 percent in the lower extremities and blood flow dropped by as much as 60 percent.

One of the possible results of the research findings will be to educate individuals with spinal cord injuries on perceiving and ultimately controlling episodes of autonomic dysreflexia, which may result in the prevention of pressure ulcers.

Center for Environment and Energy Created

Civil engineering Professor Hsien Ping Pao thinks he’s found the way to curb global warming, one batch of fertilizer at a time.

Last December, the School of Engineering launched a new Center for Environment and Energy under Pao’s direction. It is the formalized union of two colleagues who first started sharing notes on the subject of global climate change 10 years ago, when now Visiting Professor Jerry Shang worked for the U.S. Department of Energy. Shang now joins the center — and CUA’s faculty — as the center’s chief scientist.

Shang and Pao are specifically interested in the science of carbon sequestration, which involves taking CO2 from power plants and removing the carbon through scrubbing and converting it into a water soluble fertilizer that eventually breaks down, leading the carbon to underground aquifers, and eventually turning it into limestone, a stable form of carbon. Shang calls sequestration an environmental “win-win,” because it removes carbon from the air and provides fertilizer.

Pao refers to this form of carbon sequestration, as “Mother Nature’s Carbon Tax,” but says it has not been researched outside of China. Some Chinese fertilizer companies actually produce carbon to add to fertilizer, but Pao and Shang’s method would utilize carbon that would otherwise be polluting the air and adding to the greenhouse effect.

The center is pursuing funding from the United Nations and the World Bank, two international institutions that Pao believes will see the benefit of this system, especially for developing countries that rely heavily on agricultural production.

The center will offer workshops as well as short academic courses for students and outside professionals and civil servants, in the hope of educating those in the field about carbon sequestration. Pao says the center will collaborate with a professor at Western Kentucky University, likely doing the bulk of their field work using a smokestack in that region.

The benefits of this form of sequestration could be huge, says Pao, who notes that more than 50 percent of America’s power plants are fueled by coal, an available and cheap source of fuel. If Pao and Shang’s theory holds, “then we can still use coal,” Pao explains.

The pair plans to expand the center in the coming year, devoting funding and resources to proving their theory.
IEEE Student Chapter

What do an X-box and an iPod have in common? Besides mass-consumer appeal, they both have found their way into the creative designs of CUA electrical engineers.

The CUA student chapter of the Institute of Electrical and Electronics Engineers had a busy academic year, putting a new spin on classic physics experiments, working with U.S. veterans at the National Rehabilitation Hospital, and of course, launching a few rockets.

The Rubens’ Tube, also known as the standing wave flame tube, is a classic physics experiment for electrical engineering students demonstrating a standing wave. It shows the relationship between sound waves and air pressure. A length of pipe is perforated along the top and sealed at both ends—one seal attached to a small speaker, the other to a gas grill. Once the speaker is turned on, pressure changes caused by the sound waves will cause the flames to heighten in some areas and to lower in others. That’s where the iPod comes in. This year, IEEE students hooked that speaker up to the mp3 player, watching pressure changes brought by classic rock.

IEEE students also helped turn entertainment into rehabilitation, working with CUA professors in the Center for Applied Biomechanics and Rehabilitation Research. The center has devised a way to control a Microsoft X-Box video game system so that soldiers with amputations can train their muscles in a fun, engaging manner. An artificial hand can be opened, closed or oriented by the amputee contracting the remaining muscles on his upper arm, but in order to accurately control the artificial hand, a high level of skill is required to turn those driving muscles on and off. Through intensive training, people can learn how to turn muscles on and off in a highly efficient manner. CABB R, with the help of IEEE students, hoping to make that intensive training a little more entertaining — and giving veterans a chance to enjoy a pastime so many Americans take for granted: playing video games. (For more on this initiative see page 14.)

Seeing Better Through Fly’s Eye

Through its convex, compound eye, a fly creates an array of images, a panoramic view that enables the insect to detect motion 10 times faster than the human eye and so escape even the quickest flyswatter. Seeing and recording an array of images, however, offers possibilities for visual information beyond the temporal. Department of Electrical Engineering and Computer Science Associate Professor Mark Mirotznik and Assistant Professor Scott Mathews, along with a multidisciplinary, multi-site team of researchers, have married the “fly’s eye imaging system” to a computerized camera system, a Practical Enhanced Resolution Integrated Optical Digital Imaging Camera, dubbed PERIODIC. “Array imaging systems are an important step in the design of optical-digital integrated imaging systems,” says Mirotznik. “They outperform single-lens systems while maintaining a thin form and a wide angle of view.”

The PERIODIC camera system resembles a circuit-board sandwich, with the array of lenses on the front and green circuit boards in the middle carrying information to a computer. Mirotznik explains, “The optical sensor and software components work in concert to solve underlying complex image registration and reconstruction problems in near real-time and produce high definition, multi-layer images.”

The prototype, funded by a Disruptive Technology Office challenge grant, greatly improves the resolution and dynamic range of imagery, removes glare and performs spectral filtering. It has moved the emerging “array imaging paradigm,” Mirotznik says, “toward systems that can maximize the information content of images relative to a set of prescribed imaging tasks.” Such tasks include iris recognition biometrics achieved through super-resolution, glare reduction through polarization, extended depth of focus by changing the focal point of lenses and combining those images, and enhanced dynamic range through the use of neutral density filters.

Mirotznik and his team are particularly gratified by application of the technology to burn injury assessment. “The most critical factors determining whether or not burn patients recover are rapid assessment of the degree of burns and quick, appropriate treatment,” says Mirotznik. Severe burns destroy subcutaneous blood vessels, decreasing the flow of blood to tissues, which can result in the death of tissue and loss of limbs as well as significantly increasing the chance of life-threatening infection.

“Using multi-spectral imaging through a 1650 nm spectral filter, we can accurately measure blood oxygen levels in a patient’s skin and give doctors the rapid evaluation of the extent of tissue damage they need to initiate appropriate treatment.”

“With the PERIODIC camera system, we’ve opened the door on the design and versatility of lenslet array systems,” Mirotznik concludes, “but we’re looking forward to considering many more aspects—the use of diffractives, GPU integration and the difficult nonlinear numerical optimization problem of joint approaches for registration and reconstruction.”
Most Americans may not realize this, but you don’t have to travel to Italy to view an original fresco. More than 100,000 square feet of space is covered with the plaster artwork in the nation’s Capitol building, and one CUA professor is helping to ensure those frescoes are preserved for future generations.

Mechanical engineering Assistant Professor Joe Vignola is using some very state-of-the-art laser technology to help preserve the centuries-old art. Frescoes, a type of mural painting that dates back to the pre-Christian era, are created by mixing dried pigment into wet plaster. They can last for thousands of years without fading in color, but are vulnerable to plaster failure, water damage and decay.

For centuries restoration teams have tried to repair frescoes, often by injecting plaster directly into the frescoes to bond them back to the wall. Restoring a fresco is relatively easy, says Vignola. Determining which areas of a massive fresco are vulnerable, on the other hand, can be the tricky part. Historically, restoration teams have relied on a “tapping and listening” method, detecting loose areas by listening for a hollow sound — an arguably subjective system.

That’s where Vignola’s laser comes in. By bouncing laser beams off the fresco surface, Vignola can get a computer reading that detects vibration in a fresco. The degree to which a given area of plaster resists motion gives an extremely accurate reading of a fresco’s structural integrity. The greater the vibration, the likelier that a fresco is about to fail.

Vignola was contacted by the U.S. Capitol curator five years ago and has been assessing portions of the capital’s frescoes ever since. He estimates that so far he’s covered about 7,000 square feet of fresco, thanks to a grant from the architect of the Capitol. But there’s still quite a bit of plaster left to cover and Vignola plans to keep looking for trouble spots.
Everybody knows that kids who play video games can move a mouse or joystick like lightning. The motions themselves may be repetitive, but who cares? It’s fun.

What if someone brought the fun of a video game to the repetitive tasks of physical therapy? With a start-up grant of $8,500, electrical engineering Assistant Professor Scott Mathews, in collaboration with the National Rehabilitation Hospital, is doing just that: exploring ways to bring the fun and challenge of video games to the repetitive tasks that comprise physical therapy. For amputees—especially soldiers returning from Iraq—facing the prospect and promise of learning to use technologically advanced prosthetics, the prospects look a little brighter.

“We call it ‘train and play,’ ” says Mathews, attaching electrodes that used to be connected to a joystick to his biceps and triceps. “Amputees must retrain remaining muscles to control the functions of lost muscles through the prosthetic interface. Instead of hours of boring repetition, we want them to be able to just plug into the video and have fun.”

Mathews, who designed the circuitry, flexes his arm, sending out an electrical impulse that travels down the wires to the X-box monitor. On screen a box moves from left to right, up and down, until Mathews succeeds in placing it in the open space and goes on to the next one. “The electrode is reading the muscle activity in what would be an amputee’s stump,” he says. “It’s not easy to learn, but once the muscles have been trained, the prosthesis can be fitted.”

The technology has utility not only for amputees, Mathews says. “We think this type of therapy could help many people with all kinds of cognitive/muscular issues—children with attention deficit and hyperactivity disorder to help them learn to focus; people with cerebral palsy, to train them to flex specific muscles and gain some control over their movements.”

The next step for the train and play model is a clinical trial. Then Mathews hopes to tap funding to create more refined circuitry that controls more complex video games to help amputees gain fine motor control. Says Mathews. “We want to move beyond button pushing to more complicated motions. For amputees holding a cup of coffee is a miracle.” A miracle worth working—and playing—for.

Hovercraft to Uncover Landmines

Mechanical engineering and computer science seniors usually look forward to one key rite of design-passage: creating and building a hovercraft. This year, mechanical engineering Assistant Professor Joe Vignola gave his students an additional challenge: use their powers for good.

“I felt very strongly that we needed to focus senior design on doing something useful,” Vignola says.

This year, design students were asked to conceptually develop a prototype hovercraft for autonomous detection of landmines. The hovercraft would not be radio controlled, but rather it would make its own decisions and navigate and survey on its own. This was the first time that students were asked to design a hovercraft that was not manually operated by a driver.

“Landmines are an atrocious problem in the Third World,” Vignola says, often in places that haven’t seen active warfare in decades. It’s not armed forces that suffer, Vignola notes, but rather local children and villagers who can be severely maimed or killed by stepping on an old landmine.

Students were asked to focus solely on the structure of the hovercraft, not on developing new landmine detection technology. The primary goal of the design exercise was to create a new type of platform that could carry existing technology into areas that would be hazardous for humans to venture into. The technology operating inside the hovercraft would find suspicious buried objects and mark them with a GPS signal.

The project to build this prototype, that is a collaboration between mechanical engineering and computer science, has been an important one, says Vignola, noting that the days of mechanical engineers working in a vacuum no longer exist.

Seniors finished a workable prototype and next year’s design class will pick up where the previous group of designers left off, beginning to build the structure. They’ll have some money to work with: a $62,000 grant from the U.S. State Department Office of Humanitarian Demining. The rising senior design class will spend the fall assembling and testing the hovercraft, in advance of a scheduled demonstration in March at a military testing facility.
Stealth Senior Design

Two CUA electrical engineering seniors may have found a solution to a sophisticated electromagnetic problem that has long perplexed engineers. They hope to have those findings published in a peer review journal this year.

Daniel Brosius and Christopher Ratto decided to take a closer look at frequency selective surfaces as part of their electrical engineering and computer science year-long senior design project.

The phrase “frequency selective surfaces” may sound like engineering jargon, but it is at the heart of defense technology. Military planes and ships use extensive radar to communicate with their headquarters, gather information and detect enemy coordinates. But this radar makes an otherwise stealthy plane or naval ship easily detected by an enemy's own radar. Frequency selective surfaces allow the ship's antenna to operate and its radar to function, while deflecting enemy radar to avoid detection. In other words, the ship or plane is encased in a surface material that selectively lets only certain, desired frequencies pass through.

By doing so, says electrical engineering Assistant Professor Scott Mathews, “You create a plane or ship that is nearly invisible to enemy radar, but still has fully functional radar.”

Engineers solved the “forward” problem of selective surfaces years ago. They are now able to determine what frequencies will pass through a given surface’s geometry—as well as what frequencies that geometry will deflect or absorb. And so they can build a particular shape with those known variables in mind. But working from the other direction—taking a known radar and creating a geometric pattern based on that radar—has long eluded engineers.

“Ships designers want to say ‘Here's the radar that my ship uses. What pattern do I need to make my ship invisible and make my radar still work?’ says Matthews. “That is the inverse problem and no one's completely solved it yet.”

Brosius and Ratto set about to solve that far more complex inverse problem: Given a desired electromagnetic performance that you want to allow through, what shape or what geometry must be created to get that performance?

Brosius and Ratto used an iterative method employing the Mat Lab program and an algorithm for solving the forward problem, known as the “Periodic Method of Moments” or PMM. They started by making a random guess as to the desired geometry and then entered the guess into the PMM. Depending on the outcome, they continued making changes to the geometry, each one bringing them hopefully closer to the sought-after result. By making modifications that brought them closer to their end goal, the pair eventually created the geometry that matched the desired frequency. They then built several frequency selective surfaces and measured their electromagnetic performance to see if the actual results matched up with the desired performance.

It did.

“This work is really, really sophisticated stuff,” says Matthews. “They're two of the brightest students we've had come through here in a long time.”

Mathews, in collaboration with Associate Professor Mark Mirotznik, receives funding from the Office of Naval Research to study frequency selective surfaces.

Nagel Foundation Fosters Biomedical Innovations

Nine CUA biomedical engineers have been selected as Nagel Scholars for the 2007–2008 school year, an honor which, for the last decade has been synonymous with enterprise and academic excellence.

Since 1998, the CUA biomedical engineering department has received generous support from the Edward M. Nagel Foundation to recognize and offer financial support to the program’s top scholars. To date, the foundation has provided CUA — one of just six universities in the nation affiliated with the organization — with more than $500,000 in scholarships. Nagel Scholars are required to have demonstrated outstanding academic achievement, service and community involvement. They are also chosen for their entrepreneurial acumen and industry in the field. The average GPA among the coming year's designated scholars is a 3.78.

The 2007–08 Nagel scholars are: Caitlin Matyas ('08), Bradley Miller ('08), Thomas Giuliani ('09), Emily Casadaban ('09), Theresa Murray ('10), Megan Jamiokowski ('10), Katherine Rucky ('10), Jenna Graham ('11), Patrick Noonan ('11). Scholars receive a $5,000 scholarship for each of their four years of undergraduate study.

Recent graduates of the Nagel scholar program have found places of distinction in both doctoral programs and industry. For example, Stephanie Kennedy, a 2003–2005 Nagel scholar, is attending Duke University on full academic scholarship, where she is earning a Ph.D. in biomedical engineering in the area of biomedical imaging. Lindsay DiRomualdo, a 2003–2004 scholar, is now working for Medtronic Corporation in the area of biomedical implants.
In 2003, CUA’s biomedical engineering created the Biomedical Engineering Design Center in Pangborn Hall to answer the need for a dedicated design space for biomedical engineering students to conduct senior design projects. A fabrication space was installed, along with three work stations for design teams.

In the past four years, the number of CUA biomedical engineering students has nearly doubled, and the design center itself has expanded twice more to accommodate more design teams and the current 65 undergraduate biomedical engineering majors. The center now features eight work stations, each capable of supporting design teams of three to four students. Each workstation is equipped with state-of-the-art equipment for computing design, fabrication and prototyping, and testing equipment.

For students in their junior and senior year completing design projects, and for Binh Tran, the department chair, having a fabrication space inside the renovated studio was critical. Tran says he believes biomedical engineers need to learn how to build models, not just create a design in a computer and then send it off to a machine shop to be constructed. So now design students have access to drill bits, lathes, band saws and raw materials and are expected to create a 3-D working prototype of their design by the end of a one-semester design studio.

Tran also sees this studio as a means to bring CUA into the forefront of the nation’s biomedical engineering programs.

“We want to be competitive in national design competitions,” Tran says. “These renovations have enabled us to participate in those competitions.” It has also better enabled the school to bring those competitions and conferences to CUA’s campus. This year, CUA hosted a biomedical conference (see sidebar) bringing students, professors and professionals from across the country for several days of discussions and paper presentations on contemporary topics in biomedical engineering.

Given the steady growth of the biomedical engineering department, the current studio may need to be expanded yet again before too long. But for Tran, those are welcome growing pains.

**CUA Engineers Place Third in National Design Competition.**

Two CUA biomedical engineering students aim to take the heavy lifting out of the medical profession — and they are earning national accolades along the way.

The two students set out to find a safer, more efficient way to transport patients from the hospital bed to various testing areas as part of their junior design project two years ago. Transferring patients who are immobile or obese from hospital bed to gurney to MRI table can place a physical strain on health care workers and risk injury to the patient — not to mention take up critical time. The students, Afshin Nabili and Roland Dinga, continued the project the following semester as part of an independent study under the direction of department chair Binh Tran.

After finishing the design and prototype, they entered the project, “Patient Imaging Transferring System (PITS),” in the Accessible Medical Instrumentation National Student Design Competition. Nabili and Dinga’s design was judged against more than 50 designs from around the country, most of them submitted by seniors who had spent two design semesters completing their final product. The pair placed third in their category, patient transfer-and-positioning device, and earned a $500 prize.

The goal was to design a system in which the patient never has to get out of bed — technically. This could be achieved by designing a new kind of gurney with a detachable surface. The top portion remains under the patient whether they are in a hospital bed or on the gurney. The patient can be slid easily from bed to gurney and locked into place. The PITS device also can be converted into a wheelchair for better transport. Once at the lab, the removable portion slides from gurney to testing table. The students designed the material to be compatible with MRI equipment.

“There’s definitely a gap in the marketplace,” says Tran. “There’s nothing like it out there right now.”

Which is why Tran is in the process of getting the design patented. The patent disclosure is currently being reviewed by the university’s patent committee, which will make a recommendation soon as to whether to sponsor the patent application.

**Biomedical Conference Puts CUA on the Map**

This past spring, the biomedical engineering department hosted the Southern Biomedical Engineering Conference at CUA — the first time CUA has hosted such a gathering. Eighty engineers, academics and students participated in the conference, and graduate or undergraduate students comprised about half of that number. Faculty and members of industry and government, including speakers from Johnson & Johnson and the U.S. Food and Drug Administration, attended the three-day conference. Of the attendees who had submitted abstracts in advance of the conference, 50 presented their papers, which will be published in a volume in the coming months.
Faculty

Grants


Presentations and Publications


Sun, L., “Monte Carlo simulation based pavement performance prediction using AASHTO design equation,” Pavement Engineering Workshop, Southeast University, Nanjing, China, May 1–2, 2006.


Diggs, E.C., Bilgen, O., Kurdila, A.J., Kochersburger,


C.C. Nguyen, S.A. Mathews., editor of the July 2006. He was also chosen to be an associate
in the Advisory Committee for the International
lecture at World Automation Congress 2006,
Ph.D., electrical engineering and
and Optical Engineering, TSI Publisher,
and Image Processing, TSI Publisher, in
Informatics and Image Processing, TSI Publisher, in

S.A. Mathews., Ph.D., electrical engineering and
computer science, was session chair for Laser
Applications in Microelectronic and Optoelectronic
Manufacturing XII, SPIE Photonics West, San Diego
CA, 2007. He served as faculty adviser for the CUA
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Writing on America and Teen Writing Award Dinner,
Viet Bao, Westminster, CA, in August 2006. He visit-
ed Tsinghua University and Peking University in
Beijing, China; Southeast University in Nanjing,
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Hong Kong University of Science and Technology
and Hong Kong Polytechnic University, both in Hong
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memoranda of understanding in Oct. and Nov.
2006. He also visited National Singapore University,
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Awards
- Nguyen, C.C., D.Sc., dean, Member Resolution No. 2580 from the California Legislature Assembly for dedication and contributions in the area of education to the people of the State of California, Westminster, Calif., Aug. 2006.
- Nguyen, C.C., D.Sc., dean, Honorary professorship from Southeast University, Nanjing, China, Nov. 2006.
- Sun, L., CAREER Award, National Science Foundation, January 2007.
- Sun, L., Award University Provost Award for Excellence in Research and Scholarship, The Catholic University of America, 2006.
- Erica Gonzalez, sophomore, civil engineering, received the 2007 ASCE-NCS Hathaway Memorial Award for Academic Excellence. She also received the 2007 BMES Award for Service Excellence to the Department of Biomedical Engineering.

Students Activities and Awards
- Gregory S. Cook, junior, civil engineering, American Concrete Institute National Capital Chapter Annual Student Award, 2006.
- Timothy J. Garland, junior, civil engineering, Glen Construction Company Endowment Scholarship through Associated Builders and Contractors Metropolitan Washington Chapter, 2006. He also received the 2007 ASCE-NCS Outstanding Student Award and the 2007 Dennis F. McCahill Award for Service in civil engineering.
- Max Tsala, senior, civil engineering, 2007 Timothy W. Kao Award for Academic Excellence in civil engineering.
- Christopher P. Logsdon, junior, civil engineering, Associated Builders and Contractors Metropolitan Washington Chapter Scholarship, 2006.
- Cathryn Jensen, senior, Megan Payne, senior, Stephen Sizer, senior, and Caitlyn Malcias, junior, biomedical engineering were named 2006–07 Nagel Scholars. They all also received the 2006–07 Tau Beta Pi scholarships.
- Afshin Nabili, Roland Dinga, and Megan Payne, seniors in biomedical engineering, received 3rd Place in the 2006 National Accessible Medical Instrumentation Design Competition for their design project entitled: “PITS: Portable Imaging Transfer System.” Tran served as their faculty supervisor on the project.
- Megan Payne, senior, biomedical engineering, received the 2007 CUA President’s Award, the highest honor to a graduating student by The Catholic University of America.
- Cathryn Jensen, senior in biomedical engineering, received the 2007 H.T. Atabek Award for Academic Excellence. She also received the 2007 BMES Award for Service Excellence to the Department of Biomedical Engineering.
- Matthew T. Brady, sophomore, civil engineering, received an Associated Builders and Contractors Metropolitan Washington scholarship in the amount of $1,500.
- Michael J. Kuklinski, sophomore, civil engineering, received an Associated Builders and Contractors Metropolitan Washington Chapter 2007 ABC Scholarship for $1,000.
- Andrew R. Kain, sophomore, civil engineering, won a $1,000 2007 ABC Scholarship from Associated Builders and Contractors Metropolitan Washington Chapter.
- Hassan Taherinejad, graduate student, civil engineering, received a scholarship of $1,000 from Associated Builders and Contractors Metropolitan Washington Chapter.
- Brian Logsdon, senior, civil engineering, received a 2007 ABC Scholarship for $1,000 from Associated Builders and Contractors Metropolitan Washington Chapter.
- Erica C. Gonzalez, sophomore, civil engineering, received a 2007 CMAA National Capital Chapter Scholarship for $1,000 from Construction Management Association of America National Capital Chapter.
- Michael J. Kuklinski, freshman, civil engineering, won a 2007 CMAA National Capital Chapter Scholarship for $1,000 from the Construction Management Association of America National Capital Chapter.
- Matthew T. Brady, freshman, civil engineering, was awarded a $1,000 2007 CMAA National Capital Chapter Scholarship from the Construction Management Association of America National Capital Chapter.
- Paul de Vuyst, freshman, civil engineering, received a $1,000 2007 CMAA National Capital Chapter Scholarship from the Construction Management Association of America National Capital Chapter.
- Kathryn Kazior, sophomore in civil engineering, received from Construction Management Association of America National Capital Chapter a 2007 CMAA National Capital Chapter Scholarship for $1,000.
Concrete Canoe Team In Action
Each year students from CUA’s student chapter of the American Society of Civil Engineers, join students from universities around the country in the Concrete Canoe Competition.
Students build their vessels out of concrete, reinforced according to certain preset rules and challenging specifications that change every year. Long enough to carry four, the canoes must pass a swamp test before students are allowed to take it out in deeper water. In this test, the canoes must continue to float after being intentionally filled with water. The concrete mix must be sufficiently light without the addition of any buoyant materials such as Styrofoam. In addition, the concrete must also be strong enough to survive several in-water competitions carrying up to four students.

Engineering Week 2007
Among the student projects demonstrated during Engineering Week 2007, the electrical engineering students pictured below used the ancient—a flame—and the modern—a popular mp3 player—to bring a classic electrical engineering experiment to life. They created a ‘Ruben’s Tube,’ also known as the standing wave flame tube, which shows the relationship between sound waves and air pressure. For a full explanation of this experiment see page 12.
As always, the hard-working students were more than ready at the end of the week to kick up their heels at the annual ball, as the ones pictured below seem to be doing quite well. Students put on the dog for dancing, conversing and dining at Maggiano’s, a D.C. Italian eatery. All work and no play? No way. At the ball Dean Nguyen announced that electrical engineering was the winner of the Engineer’s Week 2007.
Congratulations to the Class of 2007!

Master of Mechanical Engineering
Patrick O’Malley

Master of Science in Computer Science
Eytan Z. Aeppli
Joy Akar Aquino
Waild Barmohamed
Silvia M. Castillo
Matthew E. Earsly
Jacqueline Renate Frady
Steven Darnell Grant
Jaewhanh Gundy
Uyen T. Hall
Brandi Aundra Johnson
Dave Flomo Johnson Jr.
Sayatnay Khianthalat
Jeremiah Kulanda
Testsea W. Lemma
Jennifer Lieberman
Tracie Adell Lomax
Thomas A. Martin Jr.
Robin Antoinette Newman
Kolawole Oguntana
Patricia Obiageri Okorie
Bhavesh J. Patel
Manhzuze Rahman
Marie Selvanadin
Sheed D. Shah
Michael P. Snyder
Uthaiwan Srimongkolpitak
Rohan Roderick Stewart
Yemeseach Worku

Master of Science in Engineering
Adam Borcz
Christopher Wren Czaplak
Wesley S. Corley
Christopher Patrick Logsdon

Master of Civil Engineering
Israel Arteaga
Burak Basoglu
Lenny Danforth Jr.
Paul De Vuyt
Jacquelyn Renee Glover
Jennifer Sinclair Hankerson
Maureen Jill Lagas
Rodrigo Gonzalez Rugeles
Anupriit Thatcharanoporn
Benjamin Peter Trombly
Patrick S. Xavier Williams
Helene C. Zoghi

Doctor of Philosophy
H. Scott Coombe
Yuangsheng Mei
Neil Dominic Weston


Ph.D. Dissertations and Advisers

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