Spring 2005

The George Washington University

SYNERGY

School of Engineering & Applied Science

GW ENGINEERING:

Mittal and Hahn Team Up on Swimming Research

First Words

"WE ARE THRILLED TO BE RECOGNIZED FOR THE ROLE THAT WE ARE PLAYING TO HELP BUILD AN ENGINEERING WORKFORCE WITH BETTER REPRESENTATION FOR WOMEN."

FROM THE DEAN:
Timothy W. Tong

As I review the articles in this issue of *Synergy* magazine, I am struck by SEAS' direct and indirect contributions to the marketplace of ideas and professionals both here and abroad.

Recently, the American Society for Engineering Education published a ranking of American engineering schools according to the percentage of doctoral degrees awarded to women. GW and the University of Illinois at Chicago tied for the top slot in the ranking, and we are thrilled to be recognized for the role that we are playing to help build an engineering workforce with better representation for women. In fact, we've devoted page 7 of this issue to highlights of women in engineering at SEAS.

Our contributions to the marketplace of ideas come not only from our faculty, as one would expect, but also from our students. Students from our Department of Mechanical and Aerospace Engineering collaborated last year with Public Service Electric and Gas Company (PSE&G) to develop a new platform to help utility companies service power lines from helicopters. Students developed and presented five new designs to PSE&G, and many of the ideas generated by this project were subsequently incorporated into the prototype platform that was built for PSE&G. I invite you to read more about this fascinating learning experience—and our students' contributions to the marketplace of ideas—on page 26.

Beyond the classrooms and labs, SEAS is also undertaking a major effort to facilitate internship and co-op opportunities for all students who desire these experiences as part of their college preparation for entering the marketplace of professionals. To learn more about what we're doing—and how you can be a part of efforts to train the next generation of engineers—please turn to page 33.

The generosity of our donors continues to make possible a number of opportunities for our students. By the time GW's most recent fundraising campaign ended in June 2003, SEAS—whose goal was $20 million—had reached $50.7 million; this included $20.7 million in intellectual property rights. Money from these contributions has allowed us to provide numerous scholarships to deserving students; support student projects and participation in the steel bridge, future truck, and mini-baja competitions; and offer overseas cultural experiences for our students. We have also made significant laboratory and technology enhancements using monies from unrestricted funds.

I am excited about the education that we offer and the research that we generate, and I hope that this issue of *Synergy* conveys to you some of our contributions to the marketplace of ideas and professionals.

Sincerely,

Timothy W. Tong
Dean

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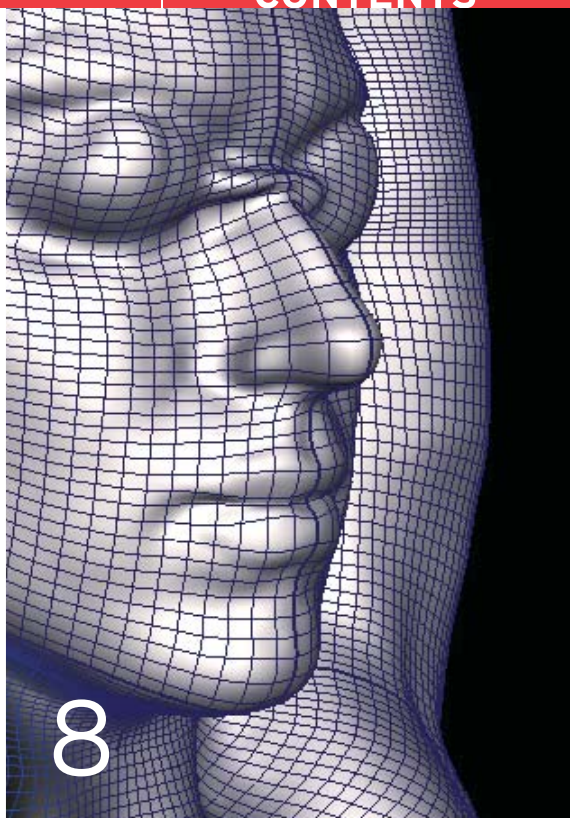

SYNERGY

SPRING 2005

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DESIGN
BRIAN COX - MINISCULE MOLECULE DESIGN

PHOTOGRAPHY
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CLAIRE DUGGAN - CDD PHOTOGRAPHY
JULIE WOODFORD - GW PHOTOGRAPHER

SYNERGY IS PUBLISHED BY THE GEORGE WASHINGTON UNIVERSITY'S SCHOOL OF ENGINEERING AND APPLIED SCIENCE.
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725 23RD STREET, NW
WASHINGTON, DC 20052
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COVER STORY:
MITTAL AND HAHN DECODE THE SECRETS OF SWIMMING

Professors Rajat Mittal and James Hahn Team Up to Study the Biomechanics of Swimming

Civil & Environmental Engineering

PROFILE

Chair: Kim Roddis
202-994-4901
www.cee.seas.gwu.edu
Full-time faculty: 11
Undergraduate students: 47
Graduate students: 77
Annual research expenditures: $6.4 million

FACULTY

Sameh S. Badie, **ASSISTANT PROFESSOR**
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Azim Eskandarian, **PROFESSOR**
Muhammad I. Haque, **PROFESSOR**
Ding-Dao (Steve) Kan, **ASSOCIATE RESEARCH PROFESSOR**
Khalid Mahmood, **PROFESSOR**
Majid T. Manzari, **ASSOCIATE PROFESSOR**
Vahid Motevalli, **ASSOCIATE PROFESSOR**
Kim Roddis, **PROFESSOR**
Rumana Riffat, **ASSOCIATE PROFESSOR**
Irving H. Shames, **DISTINGUISHED VISITING PROFESSOR**

RESEARCH AREAS

ENVIRONMENTAL ENGINEERING/BIOSYSTEMS ENGINEERING
Riffat

GEOTECHNICAL ENGINEERING/EARTHQUAKE ENGINEERING
Badie, Manzari

STRUCTURAL ENGINEERING
Badie, Manzari, Roddis

TRANSPORTATION SAFETY ENGINEERING
Digges, Eskandarian, Kan, Motevalli

INTELLIGENT TRANSPORTATION SYSTEMS
Eskandarian

Environmentally Friendly Wastewater Alternatives

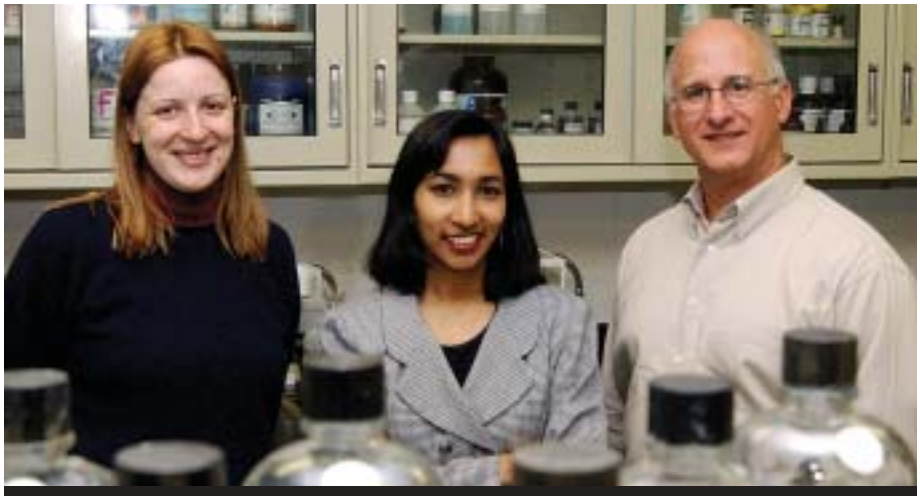
American homes and industries produce billions of gallons of wastewater every day. To ensure that we have a continuous supply of clean water for drinking, home use, and to safeguard our fisheries and wildlife habitats, this water must subsequently be treated to remove the pollutants, metals, nutrients, bacteria, and viruses that it contains.

Much of the industrial wastewater that we produce each day is saline wastewater (i.e., it has a high concentration of salt in it), and treatment facilities must rely on a combination of chemical and biological processes to treat the water so that it can be re-used. Microorganisms are used to remove pollutants from the waste stream, but the water's salinity is toxic to most microbes. So, before the microbes can be added to attack the pollutants, chemicals have to be added to remove the salinity. Using chemical treatment, however, is less environmentally friendly and generally more expensive than biological treatment.

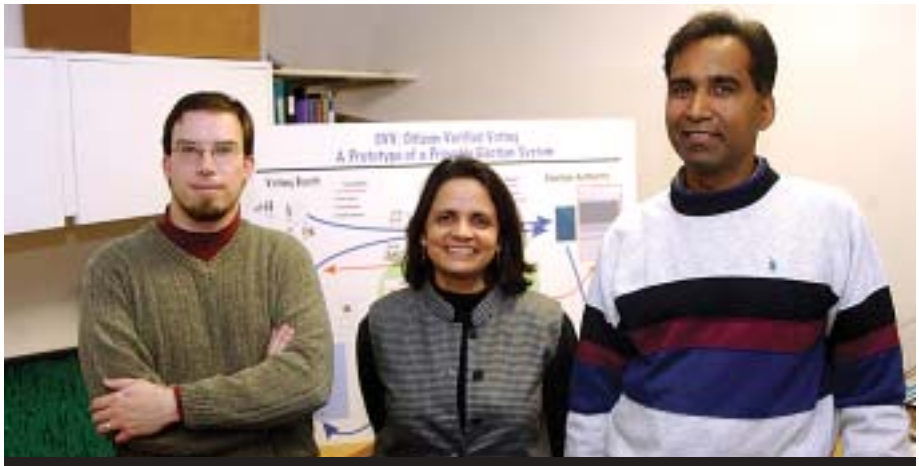
But, what if we could use microbes that are found naturally in saline environments—and, therefore, can better tolerate the salinity—to treat wastewater, thereby avoiding the added costs and environmental damage that are part of chemical treatment? Researchers have successfully used these microbes on a small scale but have not yet been able to develop a model that will work at a full-scale level sufficient for industry. This is a challenge that has intrigued Professor Rumana Riffat of the Department of Civil and Environmental Engineering for some time, and she is taking the challenge seriously.

Riffat and her graduate students are working to learn more about the kinetics and operational parameters of the biological treatment process in the hopes that they will ultimately be able to apply it full-scale at an industrial facility. In fact, they are currently involved in several research projects with the DC Water and Sewer Authority at Blue Plains Advanced Wastewater Treatment Plant. The goal of one of their projects is to determine the kinetics of bacteria that remove the nitrogen from water. This has great practical significance, since all wastewater treatment plants in this region that discharge into the Chesapeake Bay will soon face stricter limitations on discharge of nitrogen, which is a severe polluter of the Bay area.

Not surprisingly, Riffat's research is motivated in part by a desire to protect and improve our environment. Seemingly, though, she is also motivated by the sheer fun of a challenge. Says Riffat, "Researching biological wastewater treatment is more interesting than researching a mechanical system or a purely chemical system where you can predict what's going to happen. This type of treatment involves the use of microorganisms, so you can't really always predict what's going to happen. That makes it more interesting."



FULL-SCALE TREATMENT: Professor Rumana Riffat (*center*) and graduate students Marija Rajovic and Robert Tallent hope to improve biological treatment of municipal and industrial wastewater.



SOCIAL APPLICATIONS: Professors Stanton, Vora, and Simha (*left to right*) apply computer science to social goals such as improved voting systems.

Developing Electronic Voting Systems

We all remember the hanging chads controversy in the 2000 presidential elections and the calls for voting system reform. Many people looked to electronic voting systems to solve problems that have occurred with paper and mechanical voting systems, but computer scientists were quick to point out that electronic voting is not inherently superior to these systems and not automatically to be trusted.

In response to the controversy, computer scientists have struggled to come up with an electronic voting system that satisfies two competing demands: voters should be able to verify that their votes have been counted but should not be able to show others how they voted, in order to avoid the possibility of vote-buying or coercion.

Dr. David Chaum, a well-known privacy expert, has developed the theory and core cryptographic algorithm for a voting system that meets both of these requirements. SEAS professors Poorvi Vora, Jonathan Stanton, and Rahul Simha and SEAS students Ben Hosp, Nils Jansson, and John Rowe have created an actual prototype voting system based on his ideas. They have already demonstrated the system for other researchers, including the National Institute of Standards and Technology, and have received positive responses. "Now we're working to solve the reliability and extensibility issues to expand this idea into a practical voting system that can be used for a general election," says Stanton.

Vora explains the idea behind the system. "With this system, the machine produces two halves of a receipt, which—when laid one of top of the other—reveal the voter's vote. The voter selects one half of the receipt to take with him, and the machine destroys the other half. The voter's receipt has a serial number and is encrypted so that the voter can't show another person how he voted. Then, all of the voters' encrypted receipts, with serial numbers, are put on a public website for public counting, and the voter can check that his receipt is among those posted for counting. Election officials can then take this publicly posted list of encrypted ballots, strip the voter identification information from it, and decrypt the receipts without being able to change the votes. The actual decryption process requires the presence of trustees who represent various people or issues: the candidates themselves, the government, issue organizations, etc. All the system requires to work properly is that all of the trustees don't collude; and since you have naturally competing entities the system ought to work."

When asked why they took on this research, Simha replies, "This is an interesting application of computer science to a problem not having to do with computers as such." Stanton adds, "There's an intense demand for better quality government services to achieve social goals. This is a very concrete example of that problem, and we're able to contribute something that other people outside of technical experts will appreciate."

PROFILE

Chair: C. Dianne Martin
202-994-7181
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Full-time faculty: 24
Undergraduate students: 141
Graduate students: 363
Annual research expenditures:
$2.7 million

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Peter Bock, **PROFESSOR**
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Rachelle S. Heller, **PROFESSOR**
Lance J. Hoffman, **DISTINGUISHED RESEARCH PROFESSOR AND ACM FELLOW**
Newton Howard, **RESEARCH PROFESSOR**
Robert W. Lindeman, **ASSISTANT PROFESSOR**
C. Dianne Martin, **PROFESSOR AND ACM FELLOW**
W. Douglas Maurer, **PROFESSOR**
Arnold C. Meltzer, **PROFESSOR**
Sead Muftic, **RESEARCH PROFESSOR**
Bagharith Narahari, **PROFESSOR**
Timothy Rosenberg, **ASSOCIATE RESEARCH PROFESSOR**
Shmuel Rotenstreich, **ASSOCIATE PROFESSOR**
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Rahul Simha, **ASSOCIATE PROFESSOR**
Jonathon R. Stanton, **ASSISTANT PROFESSOR**
Poorvi Vora, **ASSISTANT PROFESSOR**
Abdou S. Youssef, **PROFESSOR**

RESEARCH AREAS

BIOINFORMATICS AND BIOMEDICAL COMPUTING
Florea, Hahn, Simha, Rotenstreich

COMPUTER SECURITY AND INFORMATION ASSURANCE
Hoffman, Howard, Martin, Muftic, Rosenberg, Stanton, Choi

EXPERIMENTAL DISTRIBUTED AND NETWORKED SYSTEMS
Choi, Narahari, Rotenstreich, Simha, Stanton

MULTIMEDIA, ANIMATION, GRAPHICS AND INTERACTIVE COMPUTING (MAGIC)
Feldman, Hahn, Heller, Lindeman, Martin, Sibert

HIGH PERFORMANCE COMPUTING/PARALLEL SYSTEMS/ DATA MINING AND COMPRESSION
Berkovich, Bellaachia, Narahari, Simha, Stanton, Youssef

PERVASIVE COMPUTING AND EMBEDDED SYSTEMS
Lindeman, Narahari, Simha

WIRELESS SENSOR NETWORKS/MOBILE COMPUTING AND WIRELESS NETWORKING
Cheng, Muftic

GROUP SECURITY ARCHITECTURE/NETWORK SECURITY SYSTEMS/WIRELESS AND MOBILE AGENTS
Muftic, Narahari, Rotenstreich

INFORMATION POLICY AND COMPUTER ETHICS
Hoffman, Martin

INTELLIGENT SYSTEMS/MACHINE LEARNING
Bock, Howard

PROFILE

Chair: Mona Zaghloul (Interim)
202-994-6083
www.ece.seas.gwu.edu
Full-time faculty: 25
Undergraduate students: 132
Graduate students: 269
Annual research expenditures: $2.8 million

FACULTY

Shahrokh Ahmadi, **ASSISTANT RESEARCH PROFESSOR**
Nikitas A. Alexandridis, **PROFESSOR**
Lawrence Bennett, **RESEARCH PROFESSOR**
Robert L. Carroll, **PROFESSOR**
Edward Della Torre, **PROFESSOR AND IEEE FELLOW**
Milos Doroslovacki, **ASSOCIATE PROFESSOR**
Tarek A. El-Ghazawi, **PROFESSOR**
Kie-Bum Eom, **PROFESSOR**
Robert J. Harrington, **PROFESSOR AND IEEE FELLOW**
Hermann J. Helgert, **PROFESSOR**
Walter K. Kahn, **PROFESSOR AND IEEE FELLOW**
Can E. Korman, **PROFESSOR**
Nicholas Kyriakopoulos, **PROFESSOR**
Roger H. Lang, **PROFESSOR AND IEEE FELLOW**
Ting N. Lee, **PROFESSOR**
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Branimir R. Vojcic, **PROFESSOR**
Wasyl Wasylkiwskyj, **PROFESSOR AND IEEE FELLOW**
Mona Zaghloul, **PROFESSOR AND IEEE FELLOW**
Jason M. Zara, **ASSISTANT PROFESSOR**

RESEARCH AREAS

COMMUNICATIONS AND NETWORKS
Doroslovacki, Helgert, Lang, Lee, Pelton, Subramaniam, Vojcic

BIOMEDICAL ENGINEERING
Loew, Zara

MICROELECTRONICS AND VLSI SYSTEMS
Ahmadi, Korman, Nagel, Zaghloul

ELECTROMAGNETICS
Bennett, Della Torre, Eom, Kahn, Lang, Pardavi-Horvath, Wasylkiwskyj

COMPUTER ARCHITECTURE AND NETWORKING
Alexandridis, El-Ghazawi, Saha

MULTIMEDIA PROCESSING
Alexandridis, Eom, Loew

SIGNAL PROCESSING, SYSTEMS, AND CONTROLS
Carroll, Doroslovacki, Eom, Harrington, Korman, Kyriakopoulos, Lee, Wasylkiwskyj

ENABLING TECHNOLOGY: Professors Korman, Zaghloul, and Ahmadi (*left to right*) develop sensor technology that can be tailored to uses in many fields.

Sensing Safety Concerns

"We're not experts in safety and security; we're experts in circuits and devices." This is how Professor Can Korman describes himself and Professors Mona Zaghloul and Shahrokh Ahmadi. Together, this faculty team is working to develop sensor technology that has potential applications for homeland security, environmental monitoring, and other fields.

Their joint research focuses on micro-electronic devices with surface acoustic wave (SAW) sensors. Says Korman, "One of the best ways to describe our device is as an enabling technology that people in different fields can tailor for their own applications and purposes."

While the devices they are developing could have a broad range of applications, they are most concerned with safety and security applications, such as using the sensors to detect various gases and other chemical compounds. Zaghloul draws two scenarios in which the devices could perform an important safety function. "The idea is that each of these devices would have its own miniature sensor and communications circuitry, which would enable it to send and receive signals. So, the devices could be placed in a factory to detect gas or chemical leakages, or they could be placed in airports, train stations, or other public areas that might be susceptible to a gas or chemical attack. The sensors ultimately could be networked so that once they detect a gas or chemical agent in the air, they could send signals back to a database to alert facility personnel of the potential danger."

Zaghloul, Korman, and Ahmadi believe that they are making good progress in developing a unique device, despite some obstacles. Ahmadi explains, "We don't yet have a clean room here at GW, and that's a big hurdle in our research. However, we've already reached one major milestone in our research: we've fabricated the SAW structure itself and we have working devices. The next step is to integrate the separate parts of the device so that it works as a coherent unit."

Their team is working on the integration of the parts, and they have included doctoral students in the efforts, too. Says Zaghloul, "We have several doctoral students working with us. This is state-of-the-art research, and it's good for the students because it opens employment doors for them in very highly regarded institutions."

State-of-the-Art Earthquake Engineering

When asked about the benefits of doing research using GW's state-of-the-art earthquake simulator, Professor Shahram Sarkani replies, "It's a unique opportunity to work on a piece of equipment that exists in very few places in the world."

Sarkani and a team of doctoral students at GW's Laboratory for Infrastructure Safety and Reliability (LISR) use the simulator—or "shake table" as it's known—to understand how various building materials and components behave when subjected to simulated earthquake vibrations and to learn what can be done to improve their performance. From these studies, the LISR develops cost-effective ways to protect people from the destruction of earthquakes. As Sarkani explains, "It's not earthquakes, but rather collapsing structures, that kill, so we try to learn how we can design safer structures that can better withstand or adapt to the forces of an earthquake."

He explains that earthquake engineers have two ways to do this: "We can sit in front of a computer and do simulations all day long to predict what a building may or may not do, or we can do real-life experimentation with a shake table and see if our simulations match reality." Clearly, he prefers the actual experimentation that the shake table makes possible. When Sarkani was chair of the former Department of Civil, Mechanical, and Environmental Engineering, he and SEAS professor Majid Manzari collaborated on a proposal to construct a shake table, and the National Science Foundation gave them a grant to undertake its construction. Says Sarkani, "We are now one of only five or six universities in the nation that has a table with these capabilities. Our table has six degrees of freedom, which means that we can simulate all the various motions that a structure would experience during an earthquake."

In fact, at the moment they have a scale-model, five-story building mounted on the table, and they have subjected it to earthquake forces similar to those in actual earthquakes. They built the model with a variety of joint configurations that they believe would perform better during an earthquake than the configurations that buildings currently tend to have, and they are taking measurements to see how much the structural system moves in different directions and how much the joints deform in response to the vibrations. By learning how the joint configurations perform, Sarkani believes that his team can improve the design of this model and then submit it to the research and construction community for use in a real building.

Says Sarkani, "Our challenge is to come up with practical, low-cost solutions that others will use and that will save lives. So our ultimate goal is a humanistic one."

DESIGNING SAFER STRUCTURES: "The ultimate goal of the LISR is to save lives," says Professor Shahram Sarkani.

PROFILE

Chair: Thomas A. Mazzuchi
202-994-7541
www.emse.gwu.edu
Full-time faculty: 21
Undergraduate students: 42
Graduate students: 905
Annual research expenditures: $4.7 million

FACULTY

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Abiodun Bada, **ASSISTANT PROFESSOR**
Joseph A. Barbera, **ASSOCIATE PROFESSOR**
George R. Brier, **PROFESSOR**
Enrique Campos-Nanez, **ASSISTANT PROFESSOR**
Jonathan P. Deason, **PROFESSOR**
Michael R. Duffey, **ASSOCIATE PROFESSOR**
Howard Eisner, **DISTINGUISHED RESEARCH PROFESSOR AND IEEE FELLOW**
Gideon Frieder, **A. JAMES CLARK PROFESSOR AND PROFESSOR OF STATISTICS**
Marvine P. Hamner, **ASSISTANT PROFESSOR**
John R. Harrald, **PROFESSOR**
Theresa Jefferson, **ASSISTANT PROFESSOR**
Thomas A. Mazzuchi, **PROFESSOR**
E. Lile Murphree, **PROFESSOR**
Julie Ryan, **ASSISTANT PROFESSOR**
Shahram Sarkani, **PROFESSOR**
Richard M. Soland, **PROFESSOR**
Michael M. Stankosky, **ASSOCIATE PROFESSOR**
Rachuri Sudarsan, **RESEARCH PROFESSOR**
J. Rene van Dorp, **ASSISTANT PROFESSOR**
Robert C. Waters, **PROFESSOR**

RESEARCH AREAS

ENGINEERING AND TECHNOLOGY MANAGEMENT
Brier, Duffey, Eisner, Hamner, Murphree, Waters

ECONOMIC FINANCE AND COST ENGINEERING
Duffey, Sarkani, Soland, van Dorp, Waters

KNOWLEDGE MANAGEMENT
Frieder, Jefferson, Ryan, Stankosky, Waters

ENVIRONMENTAL AND ENERGY MANAGEMENT
Deason, Harrald

SOFTWARE ENGINEERING AND INFORMATION SYSTEMS MANAGEMENT
Bada, Deason, Eisner, Frieder, Hamner, Harrald, Jefferson, Ryan, Stankosky

CRISIS, EMERGENCY AND RISK MANAGEMENT
Barbera, Deason, Harrald, Sarkani, van Dorp

SYSTEMS ENGINEERING
Abeledo, Campos-Nanez, Duffey, Eisner, Falk, Hamner, Jefferson, Mazzuchi, Sarkani, Stankosky, van Dorp

OPERATIONS RESEARCH AND MANAGEMENT SCIENCE
Abeledo, Campos-Nanez, Falk, Frieder, Mazzuchi, Soland

INFORMATION SECURITY MANAGEMENT
Hamner, Jefferson, Ryan

PROFILE

Chair: Michael K. Myers
202-994-9803
www.mae.seas.gwu.edu
Full-time faculty: 14
Undergraduate students: 90
Graduate students: 106
Annual research expenditures: $2.1 million

FACULTY

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Andrew D. Cutler, **ASSOCIATE PROFESSOR**
Charles A. Garris, **PROFESSOR AND ASME FELLOW**
Charles M. Gilmore, **PROFESSOR**
Roger E. Kaufman, **PROFESSOR**
James D. Lee, **PROFESSOR**
Kerr-Jia Lu, **ASSISTANT PROFESSOR**
Catherine Mavriplis, **ASSOCIATE PROFESSOR**
Rajat Mittal, **ASSOCIATE PROFESSOR**
Michael K. Myers, **PROFESSOR**
Yin-Lin Shen, **PROFESSOR**
Timothy W. Tong, **PROFESSOR AND ASME FELLOW**
R. Ryan Vallance, **ASSISTANT PROFESSOR**
John L. Whitesides, **PROFESSOR AND AIAA FELLOW**

RESEARCH AREAS

AEROSPACE ENGINEERING
Chichka, Cutler, Garris, Mavriplis, Myers, Whitesides

DESIGN AND MANUFACTURING OF MECHANICAL AND AEROSPACE SYSTEMS
Garris, Kaufman, Lu, Shen, Vallance

FLUID MECHANICS, THERMAL SCIENCE, AND ENERGY
Cutler, Garris, Mavriplis, Mittal, Myers, Tong, Whitesides

SOLID MECHANICS AND MATERIALS SCIENCE
Gilmore, Lee

PRECISION ENGINEERING: Professor Ryan Vallance and student researchers are developing micro- and nano fabrication tools and manufacturing processes.

The Recursive Nature of Research

Professor Ryan Vallance works in the area of precision engineering, a multi-disciplinary field whose goal is to improve the quality—meaning the precision or accuracy—of manufactured goods. As Vallance explains, "The quality of a product is directly associated with the precision or accuracy of the manufacturing process used to create the product, and to achieve precision in the manufacturing process we need precision machines and tools. So we have to create the precision tools first. But before we can do *that*, we must first develop and improve the manufacturing process that produces the tools."

This recursive problem is solved by gradual improvements to manufacturing equipment, tooling, and other technologies. Just as the machine tool industry—and later the semi-conductor industry—made tremendous improvements during the 20th century, Vallance is playing his part to make improvements in the less traditional micro/nano fabrication processes.

Vallance and a team of student researchers are developing micro- and nano fabrication tools and manufacturing processes that could have applications for biomedicine, the semi-conductor industry, and other purposes. For example, under a contract from the National Institute of Standards and Technology, Sumanth Chikkamaranahalli, one of Vallance's doctoral students, is working to write nano patterns on silicon. This is very important to the semi-conductor industry, because the development of future computing chips depends on new nano manufacturing processes.

Another application is the molds for micro lenses used in many micro-optical systems. These molds must be able to tolerate wear during repeated manufacturing. Hard materials like tungsten carbide are an ideal material for these molds because they can handle the wear, but traditional micro fabrication processes are not suited to such materials. This is where Vallance's techniques come in: using polycrystalline diamond micro tools fabricated with micro electro discharge machining, one of Vallance's students has successfully cut "3D" micro shapes in tungsten carbide. Further improvements in material removal rate (i.e., cutting away the tungsten carbide) could help manufacturers efficiently produce micro-optical systems without having to replace worn molds so frequently.

Like other researchers, the challenge of the undiscovered attracts Vallance, but he patiently takes a long-term view. "It's taken us a century to get to a high level of precision for the macro scale, so our grand objective of precision machining on the micro- and nano scales isn't going to be accomplished in the next five to ten years. There's still a lot of science to do, but that's where the fun is."

Women in Engineering at SEAS

Prof. Mona Zaghloul

PROFESSOR MONA ZAGHLOUL of the Department of Electrical and Computer Engineering (ECE) has achieved many firsts in her career. In 1975, she earned her Ph.D. in electrical engineering from the University of Waterloo (Canada), the first woman to earn a doctorate in engineering from Waterloo. Zaghloul joined the GW faculty in 1980 as an assistant professor and as the first female appointed to the SEAS faculty. In 1989, she was promoted to full professor, making her the first female to earn the rank of full professor at SEAS. She was also the first woman at SEAS to chair an academic department, serving as the chair of the former Department of Electrical Engineering and Computer Science from 1994 to 1998. She has recently accepted the ECE chairmanship, this time as interim chair until June 2005.

Zaghloul has pioneered engineering education for women and made significant contributions to engineering education, including pioneering the teaching of micro-electrical-mechanical systems (MEMS) at GW by introducing two graduate courses in the subject in 1998. She feels very positive about the strides that women are making in the engineering fields, saying, "I have found engineering a very rewarding career, and I'm happy to see that so many other women are advancing in the engineering fields and finding their careers rewarding, too."

SEAS Leads Nation in Percentage of Engineering Doctoral Degrees Awarded to Women

According to 2003 statistics released by the American Society for Engineering Education (ASEE) in October 2004, SEAS ranked first in the country in the percentage of doctoral degrees awarded to women. GW and the University of Illinois at Chicago tied for the top slot, with women representing 31.4 percent of the students who received engineering doctoral degrees from each university in 2003.

SEAS also ranked 10th nationwide for its percentage of women faculty members, with women accounting for 13.3 percent of the SEAS faculty. The rankings list the top 20 schools in terms of percentage of doctoral degrees awarded to women and percentage of women faculty members from the 85 U.S. universities that awarded 20 or more doctoral degrees in engineering in 2003. The statistics, reported in the October edition of ASEE's magazine, *Prism*, were part of a story about enrollment in doctoral engineering programs, for which a total of 181 schools provided doctoral degree figures.

"We are proud of the diversity of students, faculty, and staff at SEAS," said Dean Timothy Tong. "These rankings highlight our commitment to diversity and the distinguished company we keep among the most prestigious engineering schools in the country."

In 2003, 11 of the 35 doctoral degrees granted by SEAS were awarded to women, and 13 of the 98 SEAS faculty members were women.

The Statistics: Women in the SEAS Community

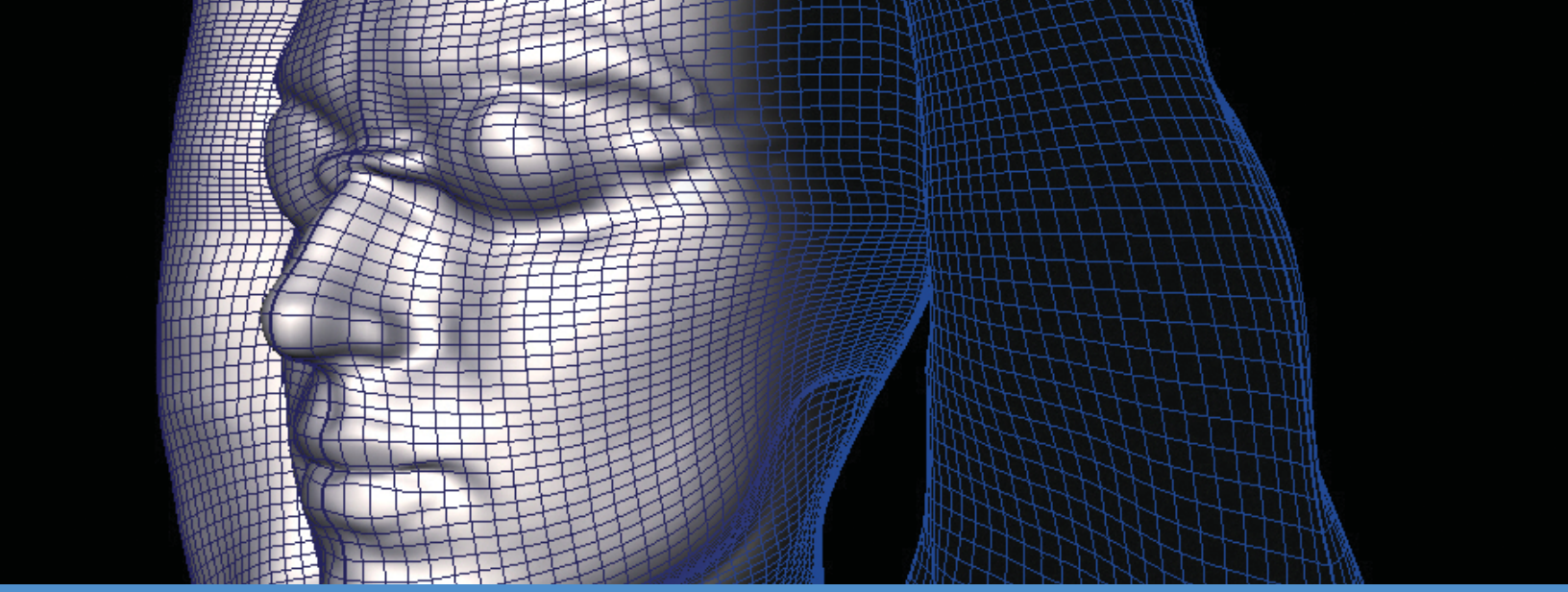
The numbers tell the story. In addition to leading the nation in the percentage of doctoral degrees awarded to women (see story above), SEAS has a very significant number of women in its student body, among its faculty, and within its administration. A look at the statistics shows that the number of women within the SEAS community is strong across the board:

UNDERGRADUATE STUDENTS:
30 percent of the undergraduate students at SEAS are women

NEW FACULTY:
3 of the 5 new faculty hired in 2003-04 are women

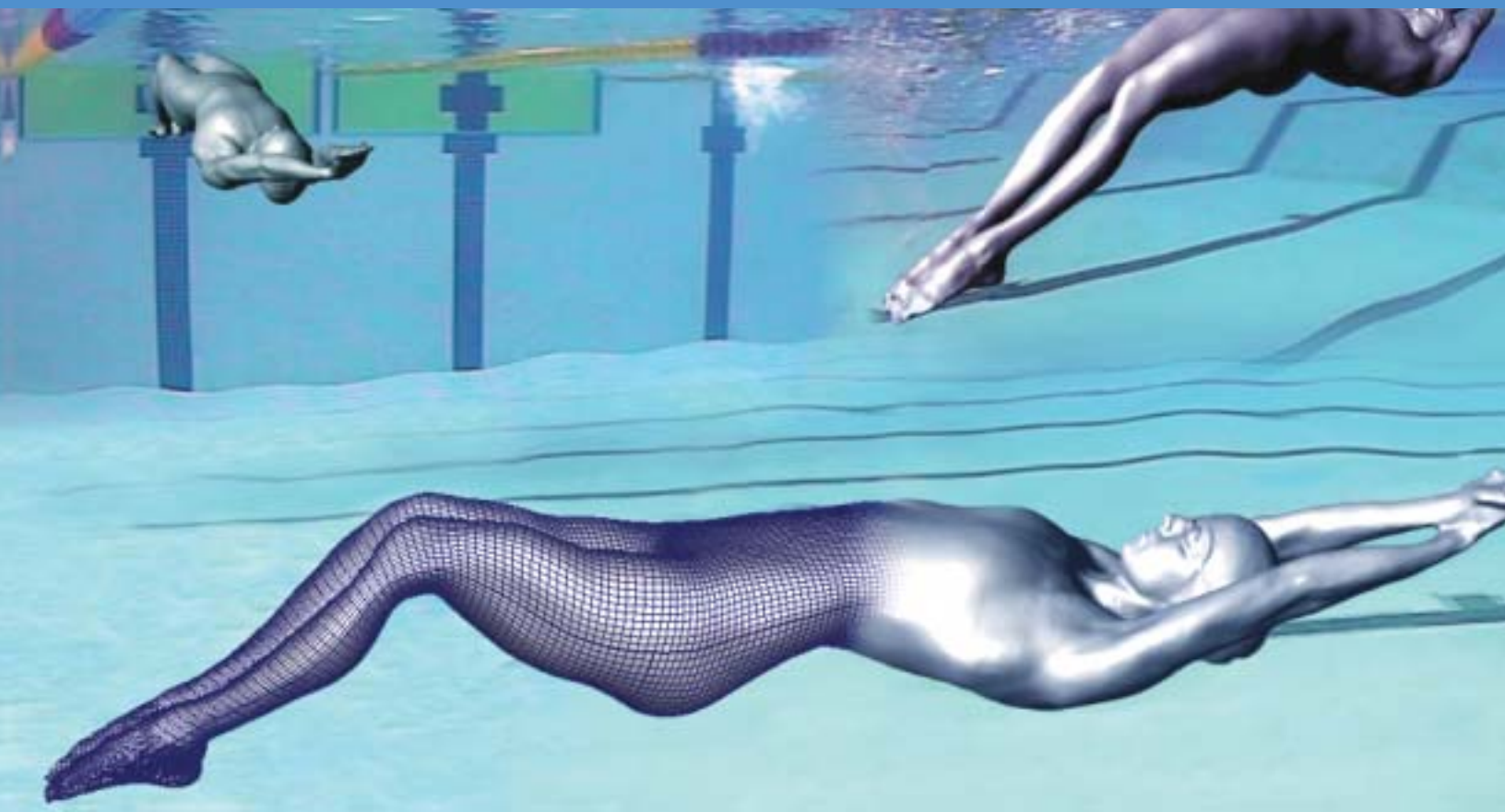
DEPARTMENT CHAIRS:
3 of 5 department chairs at SEAS are women

ADMINISTRATION:
1 of the 3 SEAS deans is a woman



Mittal and Hahn

Decode the Secrets of Swimming



COVER STORY:

An Olympian Task: Teaching Humans To Swim Like Fish

Mr. Mittal, Using **SUPERSTARS and SUPERCOMPUTERS**, Dives Deep for Answers

By Barry Newman Friday, August 13, 2004

ATHENS—Upside down, underwater and moving backward, Natalie Coughlin swims faster than almost anybody who isn't a fish. The 21-year-old Californian's talent for mimicking her fellow mammal—the dolphin—has given her an edge when pushing off the pool wall in all three of her Olympic sprints: the butterfly, backstroke and freestyle.

What makes Natalie kick? Ms. Coughlin, a psychology major at University of California, Berkeley, has a theory. "I don't know much about physics," she says. "I just know that if I make my amplitude a little smaller, I should travel faster. It's kind of intuitive."

Her answer isn't enough for Rajat Mittal. The professor of mechanical and aerospace engineering at George Washington University has developed a deep interest in Ms. Coughlin's dolphin kick. A superstar's winning move, he thinks, deserves to be pored over by a supercomputer—and, in Washington, he has one.

For the past year, Prof. Mittal, 37, has been working to load it with a three-dimensional incarnation of Ms. Coughlin undulating in a virtual pool. Even at 100 billion calculations a second, the task is huge—and a measure of how far the technological backfield of today's Olympics will go to win a few more medals. Prof. Mittal's goal, simply put, is to take the guesswork out of perfection.

"Up till now, what is good or bad in all human performance is based on intuition," he says. "Once science comes into it, some of this fuzziness about what's best and what's not will be gone."

TEAMING UP: Professors Mittal and Hahn (*foreground*) join forces for interdisciplinary research into the biomechanics of swimming.

On Prof. Mittal's office shelf, a bluegill sunfish is pickling in a jar. He has a grant to help the U.S. Navy study how the fish swims with its little front fins. The Navy wants someday to swap a machine for the moody dolphins it sends out on search missions, and that will require new levels of computer simulation, not for objects like submarines, but for things that flap and squiggle under water.

With the Navy paying the bill to drop a fish into an $800,000 supercomputer, Prof. Mittal figured he may as well drop a fishlike human in, too. He hooked up with Russell Mark, a former college swimmer who, at 24, is "biomechanics coordinator" for USA Swimming, the sport's ruling body. His job is to explore how flesh and fluid might cooperate to make swimmers move faster.

"Look across a pool," says Mr. Mark. "Every swimmer will be using different techniques because every swimmer is taught different techniques." It has been so at least since Duke Kahanamoku came up with a new kick and broke the Olympic freestyle record at Stockholm in 1912. But there are no set answers. Even James "Doc" Counsilman, a pioneer of scientific coaching who died this year, had to amend his theory that a hand slicing across a swimmer's body underwater pulls the swimmer the way propellers pull airplanes; the hand, it now seems, is still mostly a paddle.

Before computers, coaches shaped strokes the way engineers sculpt cars—by watching swimmers in a flume, the watery equivalent of a wind tunnel. Coaches today watch laser-scanned swimmers in digital flumes. That's how Speedo tested its new full-body swimsuit. Mr. Mark almost did as much.

He had two of his champs, Gabrielle Rose and Lenny Krayzelburg, laser-scanned in Hollywood. But then he got a call from Prof. Mittal, and jumped into the next dimension.

Laser-scans have a failing: They don't move. Scanned dry-land athletes can be wired up, animated and pasted into videogames. But they aren't fighting a fluid. Water's disorderly effect on motion makes picking apart a swimmer's progress hugely more complex.

"Swimmers push the water, and the water pushes back," says Prof. Mittal. "It all comes down to turbulence. If we could compute every instant in a stroke, we could understand it."

"For us, this now makes very possible something that was **ALMOST AT THE EDGE OF IMPOSSIBLE."**

That's why he needs a supercomputer. Mr. Mark donated the Rose and Krayzelburg scans, and a set of videos from USA Swimming's flume in Colorado Springs. One showed Ms. Coughlin dolphin-kicking. When he saw it, Prof. Mittal knew she was the swimmer he had to use.

"She swam straight, maintaining an even depth," he says. "All fish do this, passing a wave through their bodies from head to tail. This was it—the natural-selection stroke, the best way to swim."

Lacking a scan of Ms. Coughlin, Prof. Mittal assigned a student to superimpose her videoed body, frame by frame, onto the scan of Ms. Rose. He then asked James Hahn, director of GWU's Institute for Computer Graphics, to essentially insert a skeleton, enabling the scan to move. The output is a goggled, silver phantom, dolphining across a black screen, trailing a thin red line undulating across a graph—sort of like the markings on an electrocardiogram.

Three-dimensional, observable from all angles, this creature is Prof. Mittal's raw material. All he has to add next is water. Pushing the limits of his field-computational fluid dynamics, he plans to factor in every swirl and counterswirl produced by an ever-changing sequence of motions known as a single stroke. To account for every eddy within every eddy, he will break each stroke into 20,000 units and perform 200 million calculations on every one.

By reducing Ms. Coughlin to her elements, Prof. Mittal aims to attain an absolute awareness of what makes her so fast. "Does her body size naturally put her into the right range of amplitude?" he asks. "Should small swimmers kick at higher frequencies than big swimmers? If so, how much higher? That's what we want to know."

Don't expect an answer in Athens. The supercomputer will be mincing the dolphin kick for three more years, at least. And when it eventually applies its software to strokes that pierce the water's surface, the variables will multiply. Yet Prof. Mittal and his partners see a day coming when swimmers will have their Olympic body mechanics customized without ever getting their feet wet.

Some variables will never be downloaded: willpower, for one. And coaches who believe that natural strokes are best left natural may not want their swimmers diving into virtual pools.

"Some of our people don't care about technique at all," says Mr. Mark. But Natalie Coughlin, whose stroke is as natural as they come, isn't one of them. "You can't change physics," Ms. Coughlin says. "You might as well figure out how it works." She thinks the water in Prof. Mittal's supercomputer is just fine.

The article reprinted above appeared in the Wall Street Journal *on August 13, 2004, the opening of the 2004 Olympic Games. Although the Olympics faded from our collective consciousness just two weeks later, many Olympic hopefuls and their coaches have been hard at work since then, trying to maximize their chances of success for 2008. SEAS professors Rajat Mittal and James Hahn have also remained hard at work, making progress on their research in support of Olympic swimming.*

One afternoon this winter, Mittal and Hahn sat down with the Synergy *editor to discuss their progress on the USA Swimming project and to explain why*

their work gets the attention of people outside the swimming community, particularly those in the biomedical engineering field.

SYNERGY: *What progress have you made on your swimming-related research since last summer?*

MITTAL: IBM has something called the Blue Gene project, which the company started to regain and sustain America's lead in supercomputing. IBM's Blue Gene/L computer is now listed as the fastest supercomputer in the world and they're looking for interesting and challenging applications for it. After reading about our swimming research, the director of the Blue Gene project approached us, because they were interested in finding out whether we'd like to run our swimming calculations as one of the test applications on their new computer. We're currently in discussions with them and hopefully out of that will come collaboration with IBM. Over the summer, students and researchers from our research group will go to IBM for a few weeks to try to get our computer code working on the fastest computer in the world.

SYNERGY: *What is the significance of this potential collaboration with IBM?*

MITTAL: For us, this now makes very possible something that was almost at the edge of impossible. The biggest computer we have in our lab is a 32-processor computer. With this computer, we were estimating that a single calculation of the dolphin kick would take us two to three months. IBM will give us access to a 1,000-processor computer, on which we should be able to get one good-quality simulation every week or so. If we're able to use the computer even for a month, it will allow us to do three to four calculations and put us months ahead of schedule. Analysis of those calculations will keep us busy for another year after that.

SYNERGY: *The Wall Street Journal article didn't elaborate on the role of computer graphics in the work you've done with USA Swimming. What is the role of the computer graphics research?*

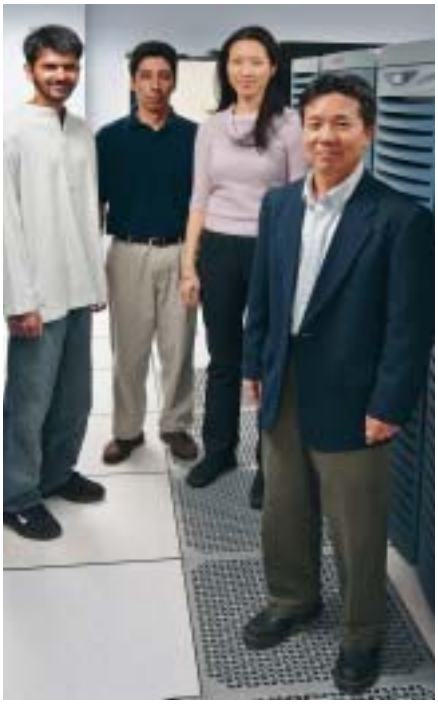
HAHN: Initially, the role of the graphics was primarily to support the CFD [computational fluid dynamics] research; that is, to provide Rajat [Mittal] with the motion as well as the laser-scanned body shape geometry for each swimmer. We now have a full research project involving three students working on the computer graphics part of the problem.

Jean Honorio Carrillo is working on the body surface geometry. We have laser-scanned geometry of two swimmers, and Jean is working on a new approach to morph those two prototypical bodies into any specific swimmer from a set of anthropomorphic measurements.

Tina Ma is working to capture the motion of the swimmers from video. The idea is to extract from the video the positions and orientations of the joints at discrete points in time. Once we extract this position orientation information, we can generate a three-dimensional representation of the motion, which can be used both for visualization and analysis of the swimming motion. Extracting the motion of swimmers has proven to be extremely difficult. The standard technology used for movies or games has been unsuccessful when working with water, due to obscurations from splashes.

TAKING THE GUESSWORK OUT OF PERFECTION: "If we could compute every instant in a stroke, we could understand it," says Professor Rajat Mittal.

GRAPHICS BY GW INSTITUTE FOR COMPUTER GRAPHICS



YOUNG BLOOD:
Left hand photo: Professor Rajat Mittal gathers with doctoral students Meliha Bozkurttas (*left*) and Alfred von Loebbecke (*center*) in front of the supercomputer they use for stroke calculations.

Right hand photo: Professor James Hahn (*right*) and students--Samir Roy (*left*), Jean Honorio Carrillo (*second from left*), and Tina Ma--handle the project's computer graphics.

We're experimenting with the use of computer vision to extract 3-D information from several synchronized video sequences. The technology comes from an approach we've been developing to track the surface of the laryngeal cartilage to guide surgeons during surgery.

Our third student, Samir Roy, is working on the visualization and analysis of the motions. Right now, the way that coaches and swimmers analyze the motion is just by looking at videotapes. By generating a 3-D representation of the same motion, we have a virtual laboratory in which the motions can be visualized using a variety of techniques. For example, we can view the motion from any angle; we can put tracers on any part of the body to show its trajectory; we can even make arbitrary measurements on various parts of the body as a function of time.

The idea behind this is that once we have a large database of different people swimming different styles, we can create a library of motions. We hope that we can then generate some hypothetical motions—extrapolated from our library of motions—that are ideal for a particular swimmer, based on that specific swimmer's physiology. USA Swimming has expressed interest in supporting these computer graphics approaches as a way to impact not only Team USA and its efforts leading to the next Olympics, but also as a way for coaches and athletes to train at all levels of competition. They have expressed an interest in working with the GW swim team, and we hope to bring them into this project in the future.

SYNERGY: *So how do the two of you actually collaborate?*

HAHN: Before Rajat [Mittal] is able to do the CFD [computational fluid dynamics] simulations, he needs a 3-D representation of the swimmer and how the swimmer is moving through space and time. We provide that shape information as well as how that shape changes as the swimmer is going through the stroke.

MITTAL: Ultimately, the goal on the fluid dynamics side is to figure out what part of the body is producing the thrust, how modifications in the stroke improve the speed and efficiency, etc. That information will be produced using the fluid dynamics software.

HAHN: The results of the CFD calculations can then come back to us for visualization along with the swimming motions.

SYNERGY: *Does anyone else work with you on this project?*

MITTAL: Yes, one of my doctoral students, Alfred von Loebbecke, is the key member of our research team. I also had a high school student, Hersh Singh, from Thomas Jefferson School of Science and Technology, work with me the last two summers, and he actually did one of our earliest simulations. Other people who are contributing to this work in our group are Meliha Bozkurttas, who is a doctoral student, and Haibo Dong, who is a research scientist. It's important to mention that there's a team at Rutgers [University] that's a partner in this project, too. The Rutgers team essentially does what we do—examine the fluid dynamics—except with real experiments in the swimming pools. So this really brings together

three different facets of the whole science of swimming, and that is unique as far as I know.

SYNERGY: *Does your research have broader applications, beyond its potential impact on Olympic swimming?*

MITTAL: This research gives us an opportunity to develop some unique software tools that can be easily applied to other areas in biology and biomedical engineering. The essential feature in the swimming simulations, if I boil it down, is fluid flow interacting with a complex, organic, moving shape; and our software can handle this as easily as it can handle any other organic entity, including for instance the heart, the lungs, or the trachea.

Take, for example, the production of voice in the human larynx, which is essentially a result of air interacting with vocal folds. The same software that simulates flow past the swimmer is being used to simulate airflow in the larynx, and we hope it can one day be used to predict the outcome of laryngeal surgery. We are also considering using this software to understand blood flow in fibrillating hearts. So, you see, the potential applications of this software are really quite diverse.

HAHN: The visualization and analysis of motion is something that we've actually done before in relation to physical therapy and in collaboration with the NIH [National Institutes of Health]. We hope that the work we are doing in this project can impact the study of human motion for physical therapy, sports medicine, psychology, anthropology, and dance. Our research on body surface geometry has the potential to affect the way the movies or the computer games industry generate large numbers of human shapes. By generating a random set of anthropomorphic measurements distributed over a particular population, we have the potential to automatically generate large crowds, armies, or virtual extras with a wide variety of body shapes.

SYNERGY: *Do you have any other thoughts to share on the impact of your research?*

MITTAL: The academic community likes to pick up what it calls "challenge problems," problems that really challenge the state-of-the-art of the field. Some times they might not have any immediate applications, but the challenges are big enough that in trying to achieve them, you end up developing a lot of new tools and technologies that find use in other places, just as our software for the swimming project is being used in simulation of voice production for people who have suffered strokes.

Secondly, in all of this, we can't forget that we're in the business of educating students, and this provides a very nice avenue for grabbing the attention of students. A student in mechanical engineering might not be interested in fluid mechanics because he or she might find it difficult or too mathematical, but if I put the same problem in the context of Olympic swimming, suddenly it can turn on the interest of that student.

HAHN: Aside from the technical contributions in the respective fields, the research has motivated a whole new set of interdisciplinary collaborations. We have learned from each other and learned to work with each other.

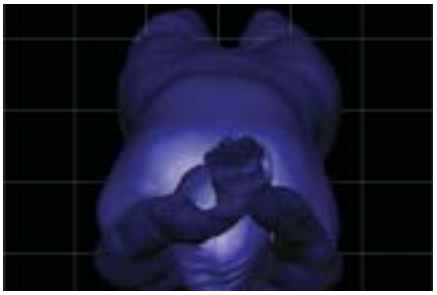
MITTAL: We found complementary skills where we would never have looked for them before.

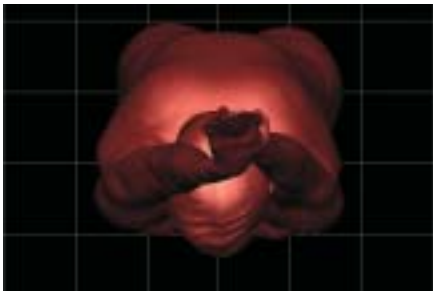
EDITOR'S NOTE:

Support for this project is provided by USA Swimming and GW's Institute for Biomedical Engineering. The institute also provides funds for a variety of other interdisciplinary pilot research activities. To learn more about the institute, please see the article on page 16.
For more information on this research, e-mail Professors Mittal or Hahn at mittal@gwu.edu or hahn@gwu.edu, or visit http://project.seas.gwu.edu/~fsagmae/Swim%20Pages/MAIN.htm

THE STROKE:

Images of a swimmer at different points in her stroke allow coaches to visualize and analyze the swimmer's motion.





Ryan Kelly

Ryan Kelly Shines As a **GAMOW FELLOW**

Ryan Kelly's college experience is, in many ways, the average college student's experience. He attends classes, studies, and enjoys the free time that he has with his friends. That's only *part* of his college experience, though.

Kelly is a junior at SEAS studying mechanical engineering with an aerospace option. Despite the demanding coursework that accompanies his major, he has maintained a high grade point average—and decided to take on more challenges.

During his freshman year, Kelly took a physics course from Professor Frank Lee of GW's Department of Physics and was hooked by Lee's enthusiasm for the subject. Kelly asked Lee about doing some research for him, and when Lee agreed, Kelly began working as his research assistant. During his sophomore year, Kelly applied for and received a prestigious Gamow Undergraduate Research Fellowship to continue his research with Lee. The fellowships, which are awarded to the most academically talented GW undergraduates, are designed to help develop the next generation of scholars and researchers by giving them opportunities to participate in mentored research with a faculty member.

Now in their second year of working together, Lee and Kelly have recently published a paper in the academic journal *Nuclear Physics B.* Based on that research, they have also authored an article that will appear in GW's undergraduate research journal, *Inquiry*. (Lee has primary authorship of the former, while Kelly takes primary authorship of the latter.)

When asked to explain the research in general terms, Kelly says, "In a word, it's 'QCD', or quantum chromodynamics. QCD is the governing theory of the strong interaction, one of the four fundamental interactions in nature besides gravity, electromagnetism, and the weak interaction. QCD describes the quarks and their interactions at the deepest level of the structure of matter. We use a method called lattice QCD, which solves QCD numerically on a space-time lattice of dimensions x, y, z, and time, using supercomputers. We've been using lattice QCD to look at magnetic moments, one of the fundamental properties of elementary particles. Incidentally, QCD was the subject that won the 2004 Nobel Prize in physics."

Kelly's role in the research has certainly given him opportunities to stretch and test himself mentally. Says Kelly, "It's been a lot of work, but it really is rewarding in itself because I've learned so much. I had to learn Unix-based systems just to do the research. I had to learn how to reformat hard drives and install new operating systems to get the computer to work properly. I basically learned an entire new computing language as a result of this, and I learned a lot about networking." And best of all, he says, "I believe that everything I'm learning in this research is applicable to my engineering career even though I'm doing research under the banner of physics."

But, this is not the end of the story. On top of his demanding class schedule and research, Kelly is active in Theta Tau engineering fraternity and was an elected member of the SEAS Engineers' Council. And somehow he still manages to spend time "hanging out with my fraternity brothers and friends"—and just being an average college student.

Simon Lee

SIMON LEE AND GW: It's a Family Affair

Simon Lee will graduate this May from GW—and so will three of his four children. Lee, his daughter Julie, and son Phillip, are all studying for the master of science degree in systems engineering at SEAS, and his daughter Michelle is enrolled in the bachelor of business administration program at GW's School of Business. Lee and his wife Anna have another daughter, Allison, who is in elementary school but already has attended GW's summer camp program for two years.

Graduations are often a time of reflection, and as Lee looks back this spring on his accomplishments, he will have much to be proud of. In 1979, Lee emigrated to the U.S. with his wife Anna and daughter Julie. By 1986, he had founded STG, Inc., a provider of information technology support services to government and industry. He is now its president and chief executive officer. Headquartered in Reston, Virginia, STG has more than 1,350 employees and consultants operating in more than 250 locations worldwide, and it is the largest Asian-American-owned systems integrator in the U.S.

Due in part to his career achievements, the Korean Broadcasting System (KBS) recently recognized Simon with the *Overseas Korean Award*, the most prestigious honor the Korean government can bestow upon a Korean-born individual. The *Overseas Korean Award* is given annually to the most prominent overseas Koreans to recognize their life-long contributions to the Korean national image and pride. This year, Lee was one of only five recipients worldwide.

When asked what the award means to him, Lee replied, "I've received many awards in the U.S., but I experienced a different feeling when I received the KBS award. This is the first time that my motherland has recognized my success in the United States. This award isn't about being connected to the Korean government but about contributing to the Korean image, so I was very pleased and proud to be selected from among an overseas Korean population of seven million people as someone who has done this."

Lee is also proud of his connection to GW and to SEAS. As another gesture of his commitment to the University—and specifically to SEAS—Lee recently gave a generous gift to SEAS. He described his motivation to make this gift by saying, "I believe that you're never too old to learn and never too young to teach. I felt very young while I was studying with my classmates, most of whom are in their mid-20s, and yet I was able to contribute my practical experience to our discussions. My vision is for SEAS to be a top-tier school, so my gift is part of my effort to promote the school and to encourage new students to attend the SEAS programs."

In appreciation of Lee's gift, Dean Timothy Tong has renamed the dean's office the "Simon and Anna Lee Dean's Suite" and will host a formal dedication of the suite later this spring.

Events

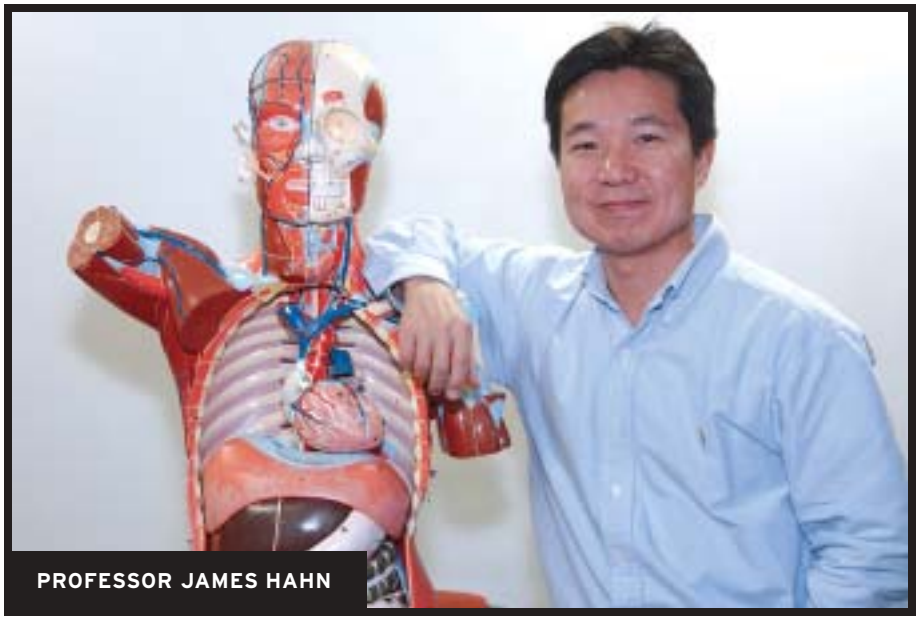
GW Founds the Institute for Biomedical Engineering

Recognizing the important role that biomedical engineering plays in enhancing the quality of the nation's health-care and reducing its cost, SEAS teamed up with GW's School of Medicine and Health Sciences (SMHS) in 2004 to create and foster the GW Institute for Biomedical Engineering (IBE).

Professor James Hahn of the Department of Computer Science is the director and a co-founder of the IBE, and six colleagues from SEAS and SMHS serve as the institute's steering committee. They are: Professors Murray Loew and Jason Zara of the Department of Electrical and Computer Engineering, Professors Roger Kaufman and Rajat Mittal of the Department of Mechanical and Aerospace Engineering, Professor Shmuel Rotenstreich of the Department of Computer Science, and Professor Raymond Walsh of the Department of Anatomy and Cell Biology.

As mentioned in the previous issue of *Synergy* magazine, GW engaged in an internal, competitive process in 2002 to identify and invest in programs that will enhance its educational and national recognition, and from that process the university selected seven areas of academic excellence for its further investment. Biomedical engineering was one of the seven areas selected, based on the existing strength of the faculty, the program's ability to leverage the assets of the university and the Washington, D.C. metropolitan area, and the relevance of the field to issues of international importance.

Remarking on the aim of the IBE, Hahn said, "We are a multi-disciplinary faculty here at the IBE, and by consolidating our resources under one umbrella we intend to function as a catalyst to further inter-disciplinary collaboration in advanced research and innovative undergraduate, graduate, and professional educational programs." Hahn added, "We are grateful for the support from GW and are eager to take a leadership role in advancing biomedical research to the next level of academic excellence."



PROFESSOR JAMES HAHN

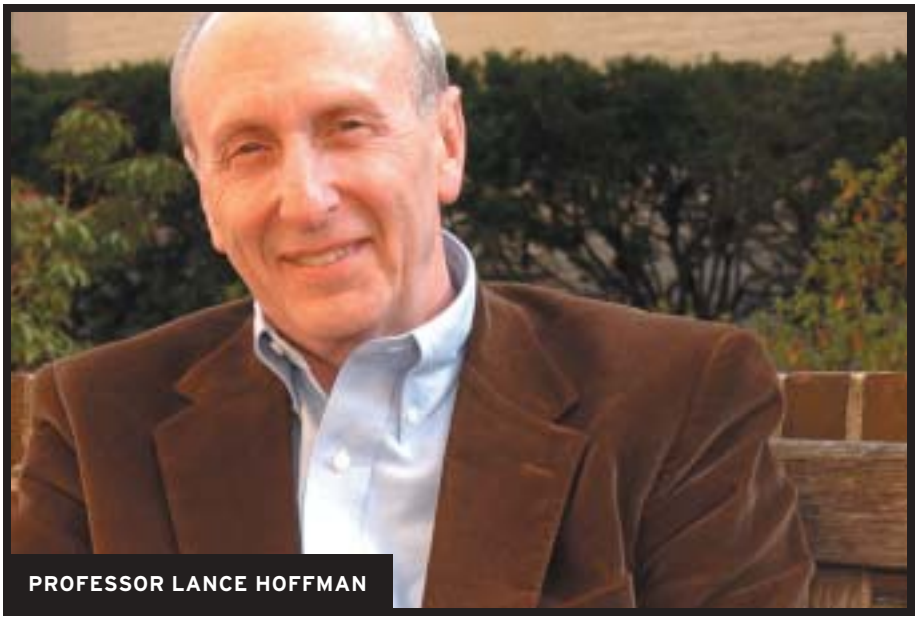
GW Commended for Its Prescriptive Decision Programs

In October 2004, the Decision Analysis Society recognized GW's graduate prescriptive decision programs with the peer-review designation of "High Quality." The society honor commends SEAS and GW's School of Business for making significant educational and research contributions to the nation's intellectual resources in decision making.

The society reviewed the teaching, research, and service activities of faculty in the decision field, and recognized GW for its decision-oriented contributions to literature and graduate education, as well as for the number of doctoral candidates who graduated from a decision program. It did not limit its definition of a decision program to a specific academic department within a university or even to an interdisciplinary center in a university. The society's study of the nation's top 34 graduate decision programs put GW in league with such universities as Johns Hopkins University, Ohio State University, the University of California-Berkeley, University of Michigan, University of Virginia, and University of Wisconsin.

In responding to the news, Dean Timothy Tong said, "SEAS is proud to contribute to the university's strength in decision-making research and education and to be recognized, along with the School of Business, for the caliber of our prescriptive decision-making programs."

The Decision Analysis Society is a professional society of university faculty and professionals working in private and public organizations. It is part of the Institute for Operations Research and the Management Sciences. For more information about the study, visit http://decisionanalysis.society.informs.org.



PROFESSOR LANCE HOFFMAN

SEAS Increases Research Spending

Dean Timothy Tong pays attention to various trends at SEAS, and he is particularly gladdened by an upward trend in the school's research spending. Since 2000, research expenditures at SEAS have more than doubled from approximately $9 million to $18.8 million.

Commenting on the strength of this trend, Dean Tong said, "Last spring, when *U.S. News & World Report* released its most recent ranking of engineering programs, it included research expenditures as a factor in the ranking. While research expenditures are just one among several factors, I see very encouraging signs for SEAS among the ranking."

In fact, research expenditures among SEAS faculty have risen so much that total SEAS research expenditures are comparable to the total research expenditures of some of the engineering schools ranked in the *U.S. News & World Report* top 50 graduate engineering programs. In last year's *U.S. News & World Report* ranking, Brown University and the University of Notre Dame shared the 50th spot, and Yale University held the 40th spot. Brown University reported research expenditures of $16.3 million, while the University of Notre Dame reported $15.7 million in expenditures, and Yale University reported $21.7 million. (Editor's note: These represent the most recent figures available from *U.S. News & World Report* as of *Synergy* magazine's publication date).

Dean Tong responded to this news by noting, "SEAS has created an ambitious strategic plan to improve the quality of the SEAS education and experience and, as a derivative of these improvements, to increase our ranking and reputation. We're continuing to make progress in our efforts to achieve the goals set forth in our strategic plan, and the good news about our research expenditures is an indication of the progress we're making. It is factors such as rising research expenditures that translate into improved education and, coincidentally, into improved rankings and reputation."

Hoffman Appointed to DHS Committee

In February of this year, the U.S. Department of Homeland Security (DHS) established the Data Privacy and Integrity Advisory Committee and announced the appointment of twenty members to the committee. Among them was Lance Hoffman, professor emeritus of the Department of Computer Science at SEAS.

The committee, known as the DHS Privacy Advisory Committee, was established to advise the DHS secretary and the chief privacy officer on programmatic, policy, operational, and technological issues that affect privacy, data integrity, and data interoperability in DHS programs. The committee will make recommendations to DHS on ways to carry out the department's mission while protecting the privacy of personally identifiable information of U.S. citizens and visitors to the country.

Members of the committee have diverse expertise in privacy, security, and emerging technology, and come from large and small companies, the academic community, and the nonprofit sector.

Hoffman will serve a four-year term on the committee and is looking forward to "contributing to the national discussion on privacy and integrity in increasingly intrusive data systems." Said Hoffman, "It will be challenging but very important to strike the right balance between security and citizens' rights in this post-9/11 age."

Also named to the DHS Privacy Advisory Committee was Howard Beales, an associate professor of strategic management and public policy at GW's Graduate School of Political Management.

Participants of the Global Summit on Regional Aviation Safety Oversight held in Washington, D.C. in February 2005

GW Aviation Institute Advances Aviation Security

In early February 2005, the University Consortium held the last of its Global Summits, designed to make international aviation more safe and secure. Led by GW's Aviation Institute, the consortium also includes George Mason University.

More than 140 participants—including prime ministers, ministers, vice-ministers, and directors general—from more than 45 countries and organizations attended the Global Summit on Regional Aviation Safety Oversight in Washington, D.C. The secretary general of the International Civil Aviation Organization (ICAO), Taïeb Cherif, also participated, as did ICAO Council President Assad Kotaite and other high-ranking ICAO officials. Representing the U.S. government were more than 50 officials from the Departments of Transportation, State, and Homeland Security, as well as the Transportation Security Administration, the Federal Aviation Administration (FAA), and the National Transportation Safety Board.

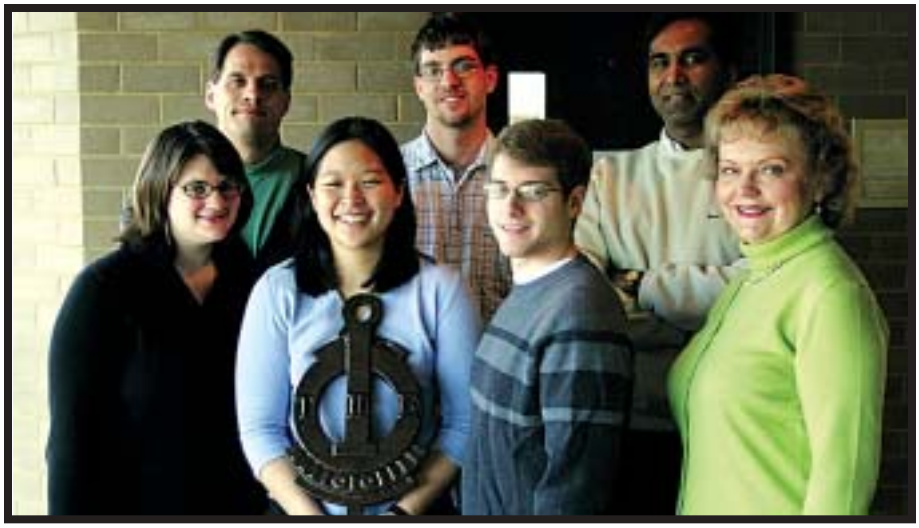
The Global Summit was the last program conducted as part of a $9 million cooperative agreement grant that the FAA awarded to the GW Consortium from 2001 to 2005 to develop an executive-level program that assists foreign civil aviation authorities in meeting aviation safety and security standards established by the ICAO.

Over the course of the grant, the consortium held fifteen summits in Washington, D.C., three regional summits in Costa Rica, Jordan, and Hawaii, and a number of other conferences and programs in Turkey, South Africa, and Poland. More than 400 representatives from 100 countries participated. Throughout the effort, the consortium enjoyed support from the highest levels of the U.S. government and the ICAO, including U.S. Secretary of Transportation Norman Y. Mineta, FAA Administrator Marion C. Blakey, and their staffs.

Professor Vahid Motevalli is the director of the GW Aviation Institute and a member of the Department of Civil and Environmental Engineering.

Responding to a question about the success of the summits, Motevalli said, "GW is now known by more than 100 countries and their high-level officials in aviation as being at the forefront of aviation safety and security."

Motevalli also mentioned another honor recently received by the GW Aviation Institute. "The FAA has designated the institute a partner in the Airworthiness Assurance Center of Excellence (AACE)," Motevalli explained. "There are only about six or seven centers of excellence formed around the country by the FAA, so being a member of one of these centers is very prestigious and something we're very excited about."



UPE MEMBERS:
Back row, left to right: Professor Rob Lindeman, Chris Toombs, Professor Rahul Simha; ***front row, left to right:*** Sarah Capellari, Cheryl Chun (President), Dan Katzel and Professor C. Dianne Martin

Success Breeds Success in Information Technology

When the SEAS faculty and administration selected information technology and telecommunications as one of the school's three areas of academic excellence back in 2002, they did so, in part, because they believe that SEAS has a strategic advantage and a record of success in this broad research area. They also believe that this area shows promise for further development.

Recent events certainly bear this thinking out. The National Security Agency (NSA) and the U.S. Department of Homeland Security have recognized GW as a National Center of Academic Excellence in Information Assurance Education, and GW has also enjoyed great success in the funded research and scholarship program in computer security and information assurance.

Since 2002, SEAS faculty working in the computer security and information assurance area have generated nearly $10.5 million in funding. More than $5 million of this funding comes from the PISCES (Partnership In Securing Cyberspace through Education and Service) program, funded by the NSA and the U.S. Department of Defense. Nineteen GW students currently are enrolled in the program and receive scholarships for their study.

Other funded research includes: an evaluation of energy costs for security in wireless sensor networks; a compiler/hardware co-design approach to software protection; assistance in building a secure operating system through a university consortium; a graduate certificate program for military officers in computer security and information assurance, with a specialization in counter-terrorism; and a study of the economic value of privacy. Funders of this research include the NSA, the National Science Foundation, the Gulf Security Council, GW, and private companies.

In another sign of success, the Department of Computer Science has recently received approval to institute at GW a chapter of Upsilon Pi Epsilon (UPE), the computer science honor society. UPE is the first and only international honor society in the computing and information disciplines, and it has received endorsements from the two largest computer organizations in the world, the Association for Computing Machinery (ACM) and the IEEE Computer Society. GW's chapter of the UPE has held two initiation ceremonies and now includes a number of student and faculty members.

SEAS Researchers Play a Role in the Mars Exploration Rover

SEAS researchers associated with NASA's Langley Research Center in Hampton, Virginia, played a major role in the Mars Exploration Rover (MER) mission in January 2004 by studying atmospheric entry and trajectory data from the rovers "Spirit" and "Opportunity." More than a year after the successful landings, researchers are continuing to examine the trajectories of both Spirit and Opportunity to study what made the dual (back-to-back) entry, descent, and landing on Mars so successful, a feat that had not been duplicated since the Viking landings forty years ago.

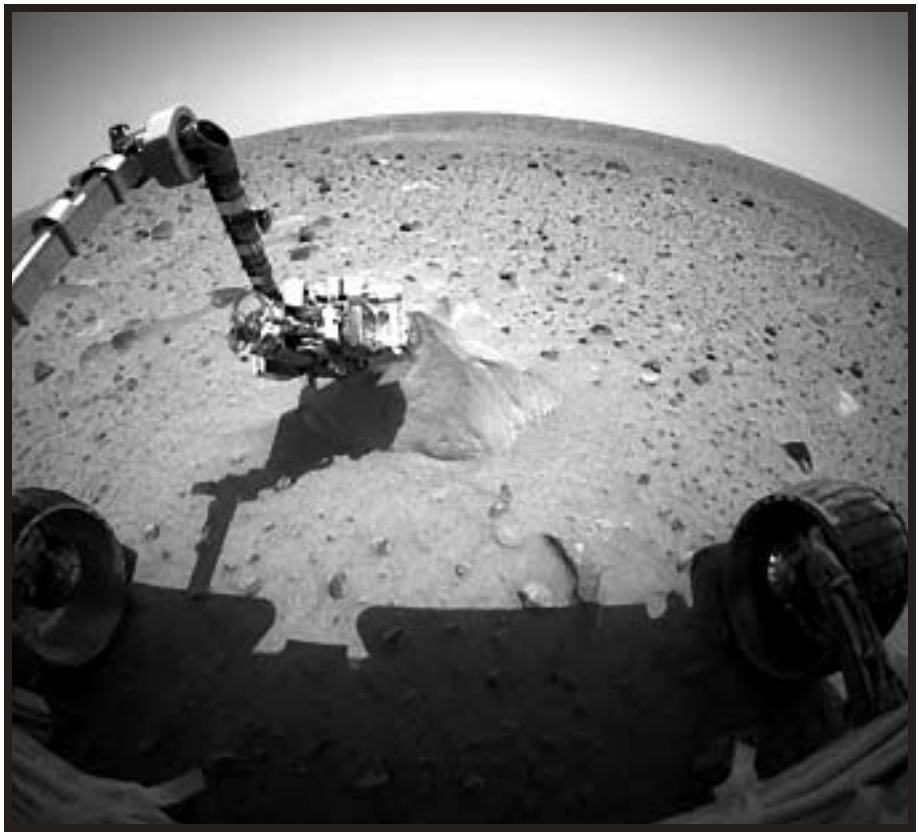


PHOTO FROM NASA'S JET PROPULSION LABORATORY WEBSITE

"Landing safely on Mars has a poor probability of success, so it's always very gratifying to be involved with a tremendous engineering achievement, such as MER," said Bob Blanchard, lead SEAS research scientist for the project. The phase of the Mars Exploration Rover mission in which the SEAS researchers have been involved is called the entry, descent, and landing phase. The descent through the Martian atmosphere takes approximately six minutes, during which time the spacecraft slows from approximately 12,000 to zero miles per hour.

SEAS researchers at Langley, previously part of the GW/NASA Joint Institute for Advancement of Flight Sciences (JIAFS), analyzed accelerometer and gyro readings from both spacecraft as they plowed through the Martian atmosphere and found NASA's temperature predictions for the Martian atmosphere to be "right on track."

Blanchard explains that onboard data collected during this phase of the mission is relayed back to Earth and a "trajectory reconstruction" is performed. "The 'trajectory' information tells us where the spacecraft was, how fast and which direction it was going, and its orientation every moment in time as it traverses the Mars atmosphere. The 'reconstruction' is like a forensic investigation; that is, we take the evidence and make a statement of the likelihood of the events that provided the evidence. Also, once we know all these trajectory parameters, it's possible to deduce some of the atmosphere properties through which the spacecraft flew."

Blanchard, who has more than 30 years of experience doing this type of research at NASA, has led a team of GW graduate students who have contributed to the overall analysis effort. In particular, he noted the role of Mike Kirsch, who has been involved in the research from its inception to the present. "We are studying the parameters that made the landings so successful in hopes of making entry, descent, and landing less formidable, more routine, so that when the U.S. attempts the first Mars manned landing, most of the unknowns will be better understood," said Blanchard.

"The tremendous success of the MER mission testifies that today's universities turn out engineers who are just sharp as those of 40 years ago. And GW, in particular, has a long history of providing outstanding engineering graduates, many of whom were my colleagues while at NASA."

EDITOR'S NOTE: This article is based on an article that Matthew Lindsay previously published in GW's *ByGeorge!* newsletter.

GW's President Trachtenberg *(second from right)*, **Executive Vice President Lehman** *(far right)*, **and SEAS Dean Tong** *(third from left)* **join Minister Jowder** *(third from right)* **and others interested in possible educational partnerships with GW.**

GW Team Visits the Middle East

For ten days in October 2003, GW President Stephen Joel Trachtenberg, Executive Vice President for Academic Affairs Donald R. Lehman, and SEAS Dean Timothy Tong traveled through the Middle East in an effort to reconnect with GW alumni living in the region and to assess the opportunities for educational partnerships between GW and local institutions.

During recent years, the University has received several friendly inquiries regarding partnerships from individuals and institutions in Kuwait, Bahrain, and Jordan. In response to these inquiries, President Trachtenberg, Executive Vice President Lehman, and Dean Tong met with officials from the University of Kuwait, the University of Jordan, and Hashemite University, which is also in Jordan. They also met with individuals in Bahrain who are involved in building a private university there. The principals of the new university in Bahrain would like to work with GW to create its academic programs, and they are especially interested in working jointly to build a computer science program. Discussions are now underway between GW and this new university to create an agreement that would facilitate possible future cooperation.

During their Middle East trip, the team held planned meetings with GW alumni in each country, including a meeting with Mr. Fahmi Bin Ali Jowder, the minister of works and housing in Bahrain and a GW/SEAS alumnus.

The team also had the good fortune to run into several alumni with whom they did not have scheduled meetings. In each instance, they were gratified to hear the alumni speak fondly of GW and say that they feel they received a good education from the University.

While the team had a full schedule of business meetings during their trip, they were able to wind up the trip with a visit to Petra, Jordan's famous "City in the Rock." Their guide for the visit was Mr. Edward W. "Skip" Gnehm, the then-U.S. ambassador to Jordan and another GW graduate. Mr. Gnehm is currently the Shapiro Visiting Professor of International Affairs at GW's Elliott School of International Affairs.

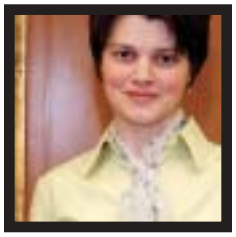
New Faculty

Dr. Abiodun Bada

Abiodun Bada is an assistant professor of information systems in the Department of Engineering Management and Systems Engineering. His research interests include information technology and organizational change, information systems in developing countries, and information technology in financial services. Before joining SEAS, Bada taught information systems at Virginia State University, the London School of Economics, and Manchester Metropolitan University (United Kingdom). He earned his Ph.D. in information systems from the University of London's London School of Economics.

Dr. Enrique Campos-Nanez

Enrique Campos-Nanez is is an assistant professor in the Department of Engineering Management and Systems Engineering. His research interests include simulation-based optimization, dynamic programming, reinforcement learning, dynamic games, and the application of these to problems of control and regulation of network services and pricing of electricity in deregulated markets. Prior to his doctoral work, he worked as a professor at the Instituto Tecnologido y de Estudios Superiores de Monterrey (Mexico), and as a consultant for Mexican industry on process simulation, decision analysis, and geographical information systems. Campos-Nanez earned his Ph.D. in systems and information engineering from the University of Virginia.

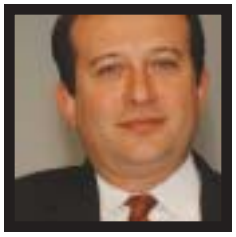


Dr. Liliana Florea

Liliana Florea comes to GW from Celera Genomics, where she worked as a bioinformatics researcher. She is an assistant professor in the Department of Computer Science, and her research interests include bioinformatics, computational biology, and algorithms. She is one of the co-authors of a groundbreaking paper that describes sequencing the human genome. The paper appeared in *Science* magazine in 2001. Florea received her Ph.D. in 2000 from Pennsylvania State University.

Dr. Kerr-Jia Lu

Kerr-Jia Lu is an assistant professor in the Department of Mechanical and Aerospace Engineering, and she comes to GW from the University of Michigan, Ann Arbor, where she earned her Ph.D. Her research interests include compliant mechanism design, genetic algorithms, structural optimization, and biomimetic shape morphing.



Dr. Vahid Motevalli

Vahid Motevalli received his Ph.D. from the University of Maryland in mechanical engineering and has been hired into a tenure track associate professor position in the Department of Civil and Environmental Engineering. His research interests include transportation safety and security. Before coming to SEAS, Motevalli was an associate professor at Worchester Polytechnic Institute in Massachusetts, and he worked with and at national laboratories such as the National Institute of Standards and Technology, the Naval Research Laboratory, and Argonne National Laboratory.

Dr. Ryan Vallance

Ryan Vallance received a Ph.D. in mechanical engineering from the Massachusetts Institute of Technology. He is an assistant professor in the Department of Mechanical and Aerospace Engineering, and he brings with him both academic and industry experience. Vallance previously was an engineer at Teradyne Connection Systems from 1996 to 1999 and an assistant professor of mechanical engineering at the University of Kentucky from 1999 to 2003. His research interests include precision engineering, machine design, and manufacturing processes for the micro/nano scales.

Dr. Poorvi Vora

Poorvi Vora is an assistant professor in the Department of Computer Science. Her research interests include cryptology, computational economics, and electronic privacy. She previously worked at Hewlett-Packard Company for nearly eight years, and before that, at IIT Bombay, IIT Delhi, and a software start-up company in Bombay. Vora earned her Ph.D. in computer engineering from North Carolina State University in 1993.

PROFESSOR W. M. KIM RODDIS

Kim Roddis Joins SEAS As Department Chairman

SEAS is pleased to introduce our new Department of Civil and Environmental Engineering chairperson, Professor W. M. Kim Roddis.

Professor Roddis joined the SEAS faculty on August 1, 2004. She previously was a member of the faculty of the structural engineering group of the Civil, Environmental & Architectural Engineering Department at the University of Kansas (KU). She was the first woman ever to earn tenure at KU's School of Engineering, as well as the first woman to earn the rank of full professor on KU's engineering faculty. During her tenure there, she served as a senior administrative fellow and as the department's associate chair.

A registered professional engineer, Roddis has experience in heavy industrial and general commercial building design, as well as in bridge design. She is a structural engineer with varied teaching and research interests, which include: design, fabrication, and construction processes; structural applications of artificial intelligence and computer-aided design; web-enhanced teaching; fatigue and fracture in bridges; frame stability; and seismic steel connections. She is recognized nationally as an expert in distortion-induced fatigue of steel highway bridges and internationally as an expert on the application of artificial intelligence and advanced computing methods to civil engineering problem solving.

Roddis currently serves as the American Society of Civil Engineers (ASCE) representative on the Board of Directors of the International Society of Computing in Civil and Structural Engineering. She is a fellow of ASCE and active at the national level in ASCE, the American Institute of Steel Construction, and the Transportation Research Board.

Roddis received each of her academic degrees (BS, MS, and Ph.D.) from the Massachusetts Institute of Technology (MIT).

Cheng Receives NSF CAREER Award

Professor Xiuzhen "Susan" Cheng of the Department of Computer Science received the National Science Foundation's (NSF) prestigious CAREER Award for 2004. The NSF's Faculty Early Career Development (CAREER) Program recognizes and supports the early career development activities of those teacher-scholars who are most likely to become the academic leaders of the 21st century. Cheng received this five-year award for her proposal on the study of "Integrated Resource Conservation in Sensor Networks."

PROFESSORS ROBERT HARRINGTON AND BARBARA MYKLEBUST

Dean Tong Names New Associate and Assistant Deans

Professors Robert Harrington and Barbara Myklebust joined the SEAS administration at the start of the 2004-05 academic year, serving as the associate dean for academic affairs and the assistant dean for undergraduate student affairs, respectively.

Harrington is a professor of engineering and applied science in the Department of Electrical and Computer Engineering and has been a member of the SEAS faculty since 1980. He previously served as chairman of the former Department of Electrical Engineering and Computer Science from 1991 to 1994 and he has been an active member of the GW Faculty Senate for many years.

Harrington's responsibilities as the associate dean for academic affairs include curriculum issues; accreditation; and program development within SEAS, with other GW schools, and with other engineering schools. When asked how he is finding the transition from teacher to administrator, Harrington said, "After many years serving as a faculty representative on the faculty senate, it is very interesting to see issues from a somewhat different point of view."

A research professor in the Department of Electrical and Computer Engineering since 2002, Professor Myklebust has degrees in biomedical engineering and physiology. She worked with the SEAS faculty in the early formulation of the GW Institute for Biomedical Engineering, one of the University's seven areas of excellence, before being named assistant dean for undergraduate student affairs.

As assistant dean, Myklebust is primarily responsible for undergraduate student recruitment, as well as undergraduate retention. Myklebust said of her new challenge, "This is a wonderful time in engineering education. The SEAS faculty are working very hard to ensure that the curricula meet the needs of the students, and provide sufficient theoretical and practical experiences to be sure our graduates are well prepared for future employment. It's exciting to be able to help prospective students understand their opportunities in engineering and applied science."

Retiring SEAS Faculty

SEAS salutes four retiring and recently retired faculty members.

LANCE J. HOFFMAN, DISTINGUISHED RESEARCH PROFESSOR OF COMPUTER SCIENCE

Professor Hoffman was a member of the GW faculty from 1977 to 2004 and a professor of engineering and applied science in the Department of Computer Science.

Hoffman led the computer security program at SEAS and continues to lead the CyberCorps computer security scholarship program and some capacity building activities. He also founded the GW Cyber Security Policy and Research Institute. During the course of his career at GW, he created innovative multidisciplinary courses on information policy, electronic commerce, and network security; devel-

oped a portable educational network for teaching computer security; directed scholarship programs for computer science students; and led efforts in capacity building and computer security curriculum material development.

DOUGLAS LINWOOD JONES, PROFESSOR OF ENGINEERING

Professor Jones has been a member of the GW community since his days as an undergraduate student. Jones received his bachelor of mechanical engineering, master of science, and doctor of science degrees from GW, and then joined the GW faculty in 1967, serving until 2004. He was a professor of engineering in the university's Department of Mechanical and Aerospace Engineering, and he served as the associate dean for academic affairs at SEAS from 2002 to 2004.

Over the course of his career, Jones showed great commitment to student advising and committee service. He served as faculty advisor to the GW chapter of the American Society of Mechanical Engineers, *Mechelociv* magazine, the Tau Beta Pi Engineering Society, and Theta Tau Professional Engineering Fraternity. His commitment to the university is reflected in the various service and teaching awards he received: the Engineer Alumni Service Award from the Engineer Alumni Association (1976), the Alumni Service Award from the GW Alumni Association (1974), and the William and Louise Corcoran Service Award from the School of Engineering and Applied Science (2004). In 1985 he received the George Washington Award; in 1996 he was recognized for his teaching excellence by the university; and in 1999 he was elected to Theta Tau's Alumni Hall of Fame. He is a member of eight honor societies.

ARNOLD C. MELTZER, PROFESSOR OF ENGINEERING

Professor Meltzer has been associated with GW since 1954, when he started his undergraduate study and stayed to complete the bachelor of science, master of science, and doctor of science degrees in engineering. He began as an instructor in 1960, joined the professorial ranks in 1962, and was a full professor by 1975.

During his 32 years as a professor, Meltzer has given distinguished service to the university at all levels. He served as chairman of the former Department of Electrical Engineering and Computer Science, as well as the interim chair of the Department of Computer Science when it was inaugurated in 1999. He also chaired or served on many university, school, and department level committees. Over the years, Meltzer worked tirelessly on undergraduate curriculum development. He has served as the advisor to the engineering honor society and has directed the dissertations of 26 doctoral students. His publication list includes journal articles, conference papers, technical reports, and a textbook on digital computer design.

RAYMOND PICKHOLTZ, PROFESSOR OF ENGINEERING AND APPLIED SCIENCE

Professor Pickholtz was a member of the GW faculty from 1972 to 2004 and a professor of engineering and applied science in the Department of Electrical and Computer Engineering, as well as a former chairman of the department. While at GW, he led the development of the telecommunications curriculum; conducted research in data communications, computer communications networking, and secure communications; and supervised many doctoral dissertations. He established the charter for the GW chapter of Eta Kappa Nu and was its first advisor.

Pickholtz has been an active author and editor of numerous papers and publications over the course of his academic career. In addition to serving on the editorial board of three major archival journals and on numerous advisory boards and committees, he has authored or co-authored several hundred technical papers and holds six U.S. patents.

In Memorium

Harold Liebowitz, dean emeritus and L. Stanley Crane Professor of Engineering and Applied Science at SEAS, passed away on April 7, 2004. He was 79 years old.

Dean Liebowitz joined the SEAS faculty in 1968 after a 20-year career with the Office of Naval Research (ONR), where he served at one point as the director of research for ONR. An aeronautical engineer, his specialty was fracture mechanics, and he helped build GW into an internationally recognized center of research in the field of fracture mechanics. He founded and edited a seven-volume treatise on fracture, which is the key reference source in the field.

"He is also credited with essentially having built SEAS," said Michael Myers, his former colleague and current chairman of the Department of Mechanical and Aerospace Engineering. "He was dean of SEAS until 1991, but he transformed this place in a matter of years and is basically responsible for the School as it exists today."

Liebowitz was recognized nationally and internationally for his outstanding contributions to engineering. In addition to serving in 1995 as the president of the National Academy of Engineering, Liebowitz was elected to five other Academies: the Ukraine Academy of Sciences; the Russian Academy of Engineering; the Japan Academy of Engineering; the Argentine Academy of Sciences; and the Hungarian Academy of Sciences. He was a fellow in many engineering professional societies and he founded and edited several scientific and technical journals, including *Computers & Structures* and *Engineering Fracture Mechanics.*

Liebowitz is survived by his fomer wife Marilyn, his daughters Alisa and Jill, his son Jay, and four grandchildren.

Achievement

MAE Students Collaborate with Industry

Maintaining public utility transmission lines in densely populated areas—such as the urban areas along the east coast of the United States—is a challenge that's just become a little easier and a little safer, thanks in part to a group of students from the Department of Mechanical and Aerospace Engineering (MAE) who collaborated with Public Service Electric and Gas Company (PSE&G) to develop a new platform for helping utility companies service power lines from helicopters.

With today's high demand for electricity in densely populated areas, public utilities find that taking transmission lines out of service—or de-energizing them—for maintenance is no longer an option. Instead, companies are forced to perform maintenance and upgrade work on energized utility lines, work that is indeed dangerous.

To help do this work, utility companies developed methods two decades ago for using helicopters. Using these methods, a lineman sits on a skid platform mounted on the helicopter's landing gear and when the helicopter reaches the utility line and stabilizes itself, the lineman on the platform performs the necessary live-work maintenance. While this platform technique works, it poses some safety problems for the lineman and concern about the helicopter's stability. Because the lineman's platform is mounted on the helicopter's landing gear, his legs can easily be injured during take-off and landing. Additionally, the platforms are large and heavy and require a counterbalance to maintain helicopter stability. Given the aerodynamics of the platform at speeds over 30 knots, the platform creates drag, making the helicopter less stable.

Recognizing the need to develop a safer platform, a PSE&G team headed by Mr. Tom Verdecchio, a senior live-line/safety coordinator at PSE&G, determined that they needed some "out-of-the-box" thinking to create a new design. They decided that engineering students might be able to provide that kind of thinking, so they approached SEAS professors Roger Kaufman and Ryan Vallance in fall 2003 and floated the idea by them. Professors Kaufman and Vallance integrated the project into their fall MAE 193 and spring MAE 195/196 classes, challenging the students to design a safe working platform that is independent of the landing gear, lightweight, and user-friendly.

As part of the project, the students took a field trip to Freeway Airport to see a PSE&G helicopter crew demonstrate simulated live-line maintenance using its current platform. Students then had to develop new designs, and by the spring semester's end, they had five designs to present to PSE&G. Verdecchio was very pleased with their work, saying, "The results were outstanding. The students' designs gave us the innovative thinking we needed to develop a safe, suitable, live-work helicopter platform. Involving The George Washington University has resulted in both original ideas and a shorter timeline from the idea stage to a working model."

SEAS students and Professors Kaufman and Vallance were equally pleased. Said Professor Vallance, "This project required our students to apply engineering principles in designing a mechanical system that really benefited industry. Our students found the project very rewarding, and we found it rewarding to see them be successful."

Unlike some student projects that serve no end beyond their completion, many of the ideas generated by this project were incorporated into the prototype platform that was recently built for PSE&G. Last summer, PSE&G did extensive testing on the platform prototype unit, and linemen reported that they have increased freedom of movement and can ride the new platform safely without sliding or losing their grip during flight. Additionally, the new platform remains sufficiently far from the ground to prevent leg injury on potential hard landings.

PSE&G still has some steps to take before the new platform becomes the standard for this method of live work, but the company expects the new platform to become the industry standard. Says Verdecchio, "In the big picture, PSE&G plans to make the platform widely available to the entire industry."

The students who participated in the project are: Janell Alexander, William Alexander, Michael Ball, Steve Beam, Rachael Buskirk, Ashley Canning, Nathan Denver, David Groespeck, Seth Katz, Keenan Moore, Jamie Olson, Steven Pifko, Rachel Safran, Laurie Sheen, Puja Valiyil, Sarah Van Pelt, and Brian Yudin.

Alexander and Debenport Selected As PAFs

SEAS is very pleased to announce that GW has once again selected SEAS graduates to be GW Presidential Administrative Fellows (PAFs). Each year, GW awards this very prestigious fellowship to only a handful of graduating seniors, and two of last year's seven fellowships were awarded to Will Alexander and Blythe Debenport, both 2004 graduates of SEAS. The fellowships were awarded in May 2004.

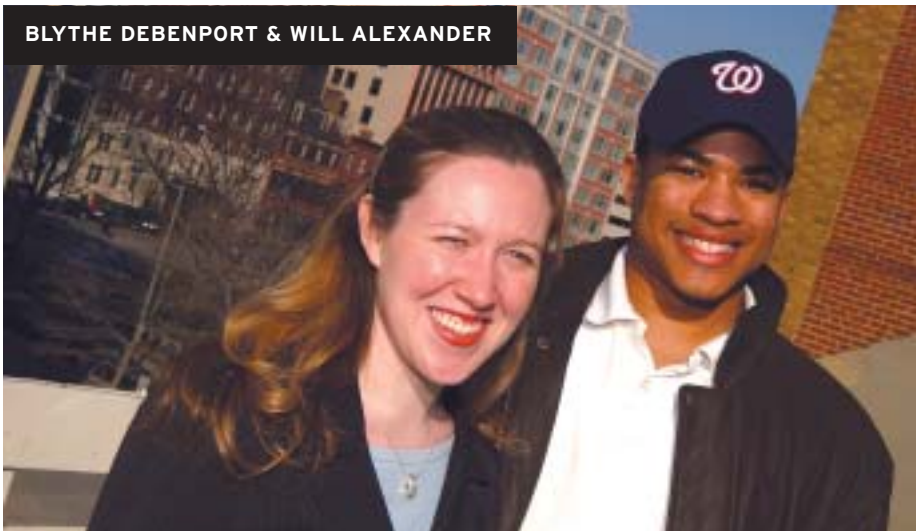
The PAF program offers graduating seniors excellent learning experiences in leadership and administration while they pursue a master's degree. In return for working in a university office and representing GW at various events, the Fellows receive free tuition and a housing and monthly departmental stipend.

Debenport elected to spend the first year of her fellowship working with undergraduate admissions and student activities for SEAS. She is enjoying her first year as a PAF, in part, she says because "I like being able to do things on a different level than I could as an undergraduate. For example, I put together the freshman retreat this year and was in charge of it. That's a role I didn't have as an undergraduate. I also like the admissions tours I do. I love watching students get excited about GW, and watching parents become less nervous about sending their children to D.C."

Alexander works at GW's Mt. Vernon campus in the office of the associate vice president and dean of freshmen. Like Debenport, Alexander also considers his fellowship a rewarding experience and has found a challenge in balancing his work, academic responsibilities, and extra-curricular activities. He explains, "I feel like this is good preparation for what I may face in the work world after I graduate, in terms of being able to distribute my time among my various responsibilities."

As with their PAF positions, Debenport and Alexander are pursuing their studies in different fields. Debenport is continuing in computer science, which she studied as an undergraduate, and Alexander, who studied mechanical engineering as an undergraduate, is now studying for the master of business administration degree in the School of Business.

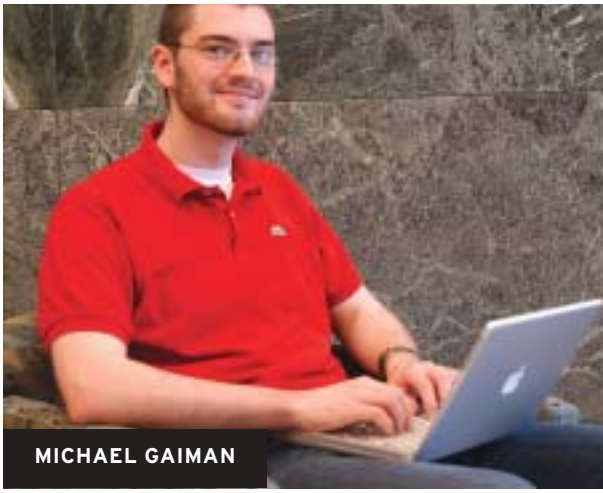
BLYTHE DEBENPORT & WILL ALEXANDER



Gaiman Gets a Taste of Project Management

"I feel like every student should get to work on a project like this while in school, because it really complements what you learn in the classroom." These are the words that Michael Gaiman, a senior studying computer science at SEAS, used to describe how he views his experience working on the Blaise project.

Blaise started out as the brainchild of Sean Hanlon, a senior in the Department of Computer Science in 2003. For his senior design project, Hanlon conceptualized and created Blaise to provide a web-based tool that instructors can use to receive papers from students, edit the papers, and then return them to the students for further work. All of the sending, receiving, and editing are done electronically.



MICHAEL GAIMAN

Hanlon stayed with the project during the summer after his graduation and was able to create a working prototype of all of Blaise's various parts before he departed. During that summer, his advisor, Professor Rahul Simha, hired Michael Gaiman to help try to develop Blaise. By fall semester 2003, the first full version of Blaise was ready, and Simha and Gaiman had received permission from the university to perform live, in-classroom trials of the project with students in two sections of the university writing program.

By spring 2004, another SEAS student, Jared Kiraly, joined the project and the team worked on version two of Blaise. In the summer, they brought on board yet another SEAS student, Eisuke Arai. Version two of the project is now nearly 90 percent complete, and the team plans to try to demonstrate it to companies to generate interest in it.

As the student project leader for Blaise, Gaiman believes that he has learned a tremendous amount from this experience. He remarks, "When I came onto the project, I had never written back-end code at all. I've now personally written perhaps 30,000 lines of code. It really has been a confidence booster, because big projects don't scare me now. It's just a matter of breaking them down."

Honor Roll of SEAS Donors

1821 Benefactors

This society is the university's highest level of donor recognition. Named for the year The George Washington University was founded, 1821 Benefactors are individuals who have made the most significant gifts to GW. Lifetime membership is granted to individuals who have made outright gifts of cash, securities, or marketable property, including irrevocable planned gifts, totaling $1 million or more. The following are the 1821 Benefactors for the School of Engineering and Applied Science.

Nelson A. Carbonell, Jr., and
Michele Carbonell
A. James Clark
The Hon. Mark R. Warner and
Lisa Collis

The George Washington Society

The George Washington Society recognizes individuals who are leaders in philanthropic support of the university and its programs. Lifetime membership is granted to individuals who have made outright gifts of cash, securities, or marketable property, including irrevocable planned gifts, totaling $100,000 or more. The following are The George Washington Society members for the School of Engineering and Applied Science.

Gurminder S. and Tricia Bedi
Gail E. Boggs
Dirk S. and Judith W. Brady
Nelson A. Carbonell, Jr., and
Michele Carbonell
A. James Clark
Emilio A. and Ofelia Fernandez
Dr. Norris C. and Joan Hekimian
Vincent N. and Dulcie E. Hobday
Prof. Douglas L. and Mary O. Jones
Frederick H. Kohloss, Esq., and Margaret
Grunwell Kohloss
Pauline W. Machen
Dr. Patrick J. and Donna Knutson Martin
Julia A. McBride
Ralph Ochsman and Rece Ochsman*
Nicholas G. and Suellen Paleologos
David I.J. and Cecile A. Wang
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Henry R. Moore
Cindy E. Moran
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Xianping Zhang+
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Key
Deceased = *
Three-year consistent donor = +
Faculty/staff = +

News

Working Overtime: Alumni Volunteer to Mentor SEAS Students

During the fall 2004 term, students in Professor Shahrokh Ahmadi's SEAS "01" class had the opportunity to see potential career paths, courtesy of those who have preceded them at SEAS. Through a joint effort arranged by Mr. Brendan Lynch, coordinator of student services; Ms. Anita Ponchione, associate director of advancement and school alumni programs; and Professor Ahmadi, students in Ahmadi's class met with two panels of SEAS alumni to learn about their career paths and to ask them questions about engineering careers.

In September, Dr. Linda Nichols (D.Sc. '96), a senior principal-operations research analyst at Mitretek Systems; and Felix Pena (BS '95), the director of mechanical design/computer services with Communications Engineering, Inc., volunteered their time to participate in the panel discussion. In December, Mr. Scott Amey (MS '75), the director of the SEAS Student Career Services Office; Mr. Maher Itani (BS '85, MEA '87), director of Tetra Tech, Inc.; and Dr. Reza Momenan (D.Sc. '90), a staff scientist at the National Institutes of Health, participated in a second panel. The panel format included plenty of question and answer time for the students, which they considered very beneficial. "I think the panel helped our students better understand where their engineering education can lead them and what professional engineering options become available to them by studying engineering," said Ahmadi.

In a separate effort led by the SEAS Engineers' Council, five SEAS alumni volunteered their time to participate in another panel discussion, "A Day in the Life of an Engineer." SEAS students Kylee Rudd and Sara Cornell led the effort, with assistance from Brendan Lynch and Anita Ponchione. The panel was designed to present SEAS alumni in varying disciplines and with varying levels of education who could give students an appreciation of the breadth of opportunities available with an engineering degree.

The alumni who generously donated their time to the EAA panel include: Dr. Anngienetta Johnson (D.Sc. '03), assistant chief engineer at NASA Headquarters; Ms. Kristy McDonnell (BS '99, MS '01), senior energy analyst/engineer at Pace Global Energy Services; Mr. Sean Walsh (BS '76), program manager at John J. McMullen Associates; Mr. David Wilson (BS '87), president and founder of Invario Network Engineers; and Mr. Dustin Graves (BS '99), computer scientist at the Naval Research Lab.

EDITOR'S NOTE:
Alumni who are interested in speaking to SEAS students or volunteering to assist with other SEAS student activities should contact the SEAS Advancement Office at 202-994-9866 or at seasalum@gwu.edu.

Seen the New SEAS Website Yet?

We've got a new look and a lot more information for alumni. To keep abreast of the latest news and information from SEAS, please visit us at: www.seas.gwu.edu.

To find out about all things alumni, including alumni events, news, the photo gallery, and the Engineer Alumni Association, just go to www.seas.gwu.edu/alumni.

Career Alumni Network

The Office of Alumni Programs and the University Career Center have launched the Career Alumni Network, and they are looking for alumni to volunteer as advisors. The Career Alumni Network is an interactive, online, career mentoring program that gives current students and GW alumni access to alumni advisors for information and advice on topics ranging from choosing a major and finding an internship to identifying potential employers and initiating interviews.

The success of the Career Advisor Network depends on you! To register or find out more about the network, contact the Office of Alumni Programs at (202) 994-6435 or 1-800-ALUMNI-7 or e-mail: alumolc@gwu.edu.

Get the Latest News from SEAS and GW

Are you receiving the latest news about SEAS and GW? If you don't regularly receive our Colonial Cable e-mail, then, chances are, we don't have your e-mail address. If you want to keep up-to-date on SEAS and GW events and happenings, please send your e-mail address to the SEAS Advancement Office at seasalum@gwu.edu or register with the GW Alumni Online community at www.gwu.edu/~alumni.

SCOTT AMEY

Lending a Hand to SEAS Students

This past fall, Dean Timothy Tong formed the SEAS Student Career Services Office to enhance students' education by facilitating internship and co-op work opportunities.

Directed on a voluntary basis by SEAS alumnus Scott Amey (MS '75), formerly the executive vice president and chief operating officer at RS Information Systems, the office serves to help facilitate internship and co-op opportunities for SEAS students. In fact, Amey has been working with a number of information technology and engineering companies and federal agencies to help arrange possibilities for 2005.

"We are so grateful to Scott Amey for helping to make this service possible for our students. We believe that internships and co-ops are valuable experiences for our students to have, because they give the students exposure to the work environment and complement what we are doing in the classrooms and labs," remarked Dean Timothy Tong. "We are also grateful to so many other SEAS alumni who are helping SEAS and its students by working with their employers to arrange internships and co-ops."

Alumni who would like to know more about how to help SEAS students get these opportunities may e-mail Amey (scott@scottamey.com) or may contact the SEAS Student Career Services Office at 202-994-7892.

Are You Prepared to Take the Scott Amey "Challenge?"

Scott Amey (MS '75) and his wife Debbie have generously committed to make a gift of $50,000 to the SEAS Dean's Excellence Fund as a challenge for other SEAS alumni to make a commitment of $1,000 or more. The Ameys have agreed to match (dollar-for-dollar) each gift of $1,000 or more to the Dean's Excellence Fund, up to a total of $50,000.

Dean's Excellence Fund supporters make it possible for SEAS to supplement scholarship and fellowship awards each year, to be prepared for technology upgrades, and to assure our students that their academic experience will include the best classroom instruction, as well as many opportunities for relevant engineering experiences outside the classroom, such as internships and participation in student competitions.

When asked why he has taken up this challenge, Amey replied, "I want to challenge the SEAS alumni to support this fund. For example, we are working on an opportunity to take some SEAS students on a field trip to the National Institute of Standards and Technology. We can pay for the transportation costs through the Dean's Excellence Fund. The flexibility of this fund is what makes it so effective."

Amey's "challenge" applies to all gifts received by December 31, 2005. Anyone interested in making a gift should contact the SEAS Advancement Office at 202-994-4121. To make a gift online, please go to: https://www.gwu.edu/online_giving/index.cfm. Please be sure to designate your gift for the SEAS Dean's Excellence Fund.

SEAS Alumni Receive GW Awards

Since *Synergy* magazine's last publication, several SEAS alumni have been recognized by GW alumni organizations for their achievements and their service to the university and their communities.

Three SEAS alumni received GW's Distinguished Alumni Achievement Award (DAAA). In 2003, Mark Hughes (BA '69, MS '77), president of the System and Network Solutions Group at Science Applications International Corporation; and Charles Watt (MEA '73, D.Sc. '86), chairman of the board of Scientific Research Corporation, received the DAAA. In 2004, Allyn Kilsheimer (BS '63), chief executive officer of KCE Structural Engineers, P.C., received it. Each year, through the DAAA, the GW Alumni Association (GWAA) honors graduates who have achieved distinction in their personal or professional lives.

The GWAA also confers a service award each year on graduates who have volunteered their time and service for the benefit of the university or their communities. Eric Mendelsohn (BS '67) received the 2003 Alumni Service Award, and Bob Kemelhor (BS '49) received the 2004 Award. (Editor's note: Eric Mendelsohn's award was noted in the previous issue of *Synergy*, because it was awarded before the magazine's publication date).

The SEAS Engineer Alumni Association (EAA) separately recognizes SEAS alumni each year through its own award, the Engineer Alumni Association Achievement Award. In 2003, the EAA presented the award to John Sporidis (BS '74, MS '81), senior vice president of Syska Hennessy Group, and in 2004 to Nelson Carbonell, Jr. (BS '85), president and chairman of Snowbird Capital.

Synergy joins the SEAS community in congratulating each of these distinguished alumni on their well-deserved honors.

SEAS SALUTES MARJORIE RHODES TOWNSEND

In 1951, GW awarded Marjorie Rhodes Townsend a bachelor's degree in electrical engineering, making her the first female to receive an engineering degree from the university. Six years earlier, in the fall of 1945, she had entered SEAS as Marjorie Rhodes, a girl from the Washington, D.C., area who was not yet 16 years old.

Marjorie Rhodes was a very bright girl who enjoyed math and science. She had skipped a few grades and finished high school early, and so she found herself choosing her next path in life as a very young person. Townsend recently explained her rationale for choosing engineering, an unusual academic and career path for women of her generation. "I had the most awful history teacher in the world in high school," she said. "When I entered college, I hadn't quite decided what to study, so I looked around for a curriculum that had math and science in it and no history, and I found electrical engineering. My father was a mechanical engineer, so that might have influenced me, as well."

When asked if she was encouraged to study engineering by any family or friends, Townsend replied, "My parents were happy for me to study whatever I wanted to study, but my father certainly did encourage me. No one said to me, 'Girls don't do that.' I never was concerned about being different from anybody else."

Being one of just two females in the school at the time did not bother Townsend; in fact, she felt that being a female engineering student presented no significant advantages or disadvantages. "You must remember," she explained, "when I started college in the fall of '45, WWII had just ended. A lot of men had the opportunity to go through college on the GI Bill. They were serious men and they didn't feel a need to hassle young women. Most of them treated me as a younger sister."

Townsend studied full-time in her first three years at SEAS, and during that time, she and Charles Townsend, a GW medical student, were introduced to each other by one of his fraternity brothers, who was also an engineering student. Rhodes and Townsend subsequently married in 1948, and she began working and going to school part-time in order to support her husband while he finished medical school. In 1951, they were graduated together.

Three months prior to graduation, Townsend began working in a career that spanned 45 years, and included raising a family of four sons. Her career started at the Naval Research Laboratory, where she worked for eight years doing sonar research. She moved to NASA's Goddard Space Flight Center in 1959 and spent the bulk of her career there. At Goddard, Townsend became known for her project management skills. Among the projects she managed were three satellite launches for NASA off the coast of Kenya. What made these launches unique were the launch services, which were provided by the Italian government. The spacecraft were NASA projects, but they were the first launches to be completed for the U.S. by a foreign government and the first to be launched outside of the continental United States. Townsend found these projects very interesting and the work fulfilling because she was also able to serve as her own systems engineer. She is proud of her project management record, too. "Good project managers tend to get things done on time," said Rhodes Townsend. "It required a learning period, but I brought my third project in early and within four percent of the budget."

Townsend's career included working for private companies and providing consulting services after her retirement from NASA. Over the course of her career, she was awarded a patent for a digital telemetry system; she received numerous professional awards and has been active in many professional and civic organizations; she maintains a long list of publications; and she is in a nearly equally long list of "Who's Who" and other biographical listings.

Looking back at such an impressive list of accomplishments in the engineering world, one has to wonder if having an awful high school history teacher was, in fact, a bit of serendipity for Marjorie Rhodes Townsend. Maybe, as she believes, it helped steer her toward her natural abilities.

KRISTY MCDONNELL

McDonnell Serves on GW Board of Trustees

Although one of GW's smaller schools, SEAS has certainly provided its share of graduates to the university's Board of Trustees.

Three SEAS graduates currently sit on the board, and two others serve as emeritus trustees. Kristy McDonnell (BS '99, MS '01), Mark Hughes (BA '69, MS '77), and Nelson Carbonell, Jr. (BS '85) are current board members, and Emilio Fernandez (MEA '76) and John Manning (BEE '57, JD '61) are emeritus trustees.

The youngest member on the board at present, McDonnell has served since June 2004, when she was formally elected to a four-year term. As a recent graduate of GW, McDonnell sees her role on the board as someone who can provide the perspective of students and young alumni and who can communicate to the board how university decisions might impact students and how students might view those decisions.

When asked how she initially became involved with the GW Board of Trustees, McDonnell responded, "The GW Alumni Association put together a slate of alumni who have been active with the university. I had been very involved with SEAS as an undergraduate and as an alumna and, thus, was nominated to the GWAA slate by Dean Tong, Professor Heller, and Mike Whitley, the previous Engineer Alumni Association president."

She said that she finds being a board member "a great opportunity." "I've been able to meet a large group of people who truly want the best for the university and the students. They have a passion for the university, and they've chosen to provide their time and their leadership, when they could choose to do so many other things," said McDonnell.

McDonnell was active at SEAS as a student and has continued her involvement with the school since graduating. As a student, she was a member of both the Engineers' Council and the Society of Women Engineers, and she participated in GW's steel bridge team and the NASA reduced gravity student program. After graduating, she was named a GW Presidential Administrative Fellow, which allowed her to remain at SEAS, where she worked for the dean and earned her master's degree in engineering management. During this time, she also became active in the Engineer Alumni Association.

She encourages other alumni to become involved with SEAS, saying, "Being involved with SEAS and with the university allows alumni to interact with each other, meet new people, and expand their networks. Another advantage is that we alumni are able to contribute to the progress and growth of the school and the university."

In Memoriam

SEAS sadly announces the death of two alumni who actively served the school and GW over the years.

L. Stanley Crane was chief executive officer of Conrail and the man credited with turning it around in the 1980s.

After earning his bachelor's degree from GW in 1938, Crane began working in the railroad industry, starting as a hands-on railroad man and moving up to the chairmanship of Southern Railway before retiring in 1980. In 1981, he came out of retirement to take over the helm at Conrail, a federally owned and unprofitable railroad. By 1986, Conrail was able to pay $200 million to the federal government, and in 1987 the government sold the railroad, netting $1.58 billion. Crane then retired in 1988.

Throughout his life, Crane remained committed to GW and found time to demonstrate his commitment. He served on the GW Board of Trustees and as the university's Medical Center Advisory chair at SEAS.

Crane passed away in July 2003 and is survived by his former wife, Joan McCoy, and his daughers Pamela and Penelope.

William B. Levin, MS (computer science) '79, dedicated himself to a 28-year career with the U.S. Naval Reactor Laboratory. Early in his career, the Naval Reactor Laboratory made him the cognizant engineer for all nuclear powered cruisers and later added responsibility for all NIMITZ class aircraft carriers. In the late 1980s and early 1990s, he led the first effort to install microprocessor-based instrumentation in nuclear powered ships and studies for advanced instrumentation system design in both submarines and surface ships. In 2000, he became the director of the laboratory's instrumentation and control division.

In recent years, Levin became active with the SEAS National Advisory Council (NAC), a leadership board that advises Dean Tong on matters relating to improving the school's quality of education and ranking. "Bill was at the forefront of many important NAC initiatives, and his energy and professionalism will be missed," said Dean Timothy Tong.

Levin passed away in December 2003 and is survived by his wife Cindy.

Happenings

Ali bin Abdullah Al Kaabi, D.Sc. (engineering management) '99, a former SEAS student and research assistant at the Institute for Crisis, Disaster and Risk Management, was appointed the United Arab Emirates Minister for Labor and Social Affairs in November 2004.

Dr. Abdullah Al-Mojil, D.Sc. (computer engineering) '97, a former SEAS student and research assistant at the High-Performance Computing Lab, was appointed the Saudi Arabia Deputy Minister for Cultural Relations in the Ministry of Higher Education.

The non-profit X Prize Foundation, co-founded by **Anousheh Ansari, MS (telecommunications and computers) '92,** awarded the $10 million Ansari X Prize late in 2003 to SpaceShipOne, a privately funded craft that reached space twice in one week, the requirements for winning the X Prize. The $10 million award is intended to spur civilian spaceflight.

Jennifer Boykin, MEM (engineering management) '94, has been promoted to vice president of process excellence at Northrop Grumman Corporation's Newport News sector. In this new position, Boykin has responsibility for strengthening sector-wide performance in all aspects of shipbuilding.

Mary Brigden, MS (information systems) '90, has been promoted to vice president of sales at Infommersion, Inc., a developer of information delivery tools. As vice president of sales, Brigden is responsible for driving revenue growth, developing strategic business alliances, and expanding the company's worldwide reseller and channel program.

Bruce Cranford, Jr., P.E., MSE (medical engineering) '76, is currently the chair of the Energetic Materials Group of the American Institute of Chemical Engineers (AIChE). He was awarded the American Institute of Aeronautics and Astronautics (AIAA) National Capital Section (Washington, D.C.) 2003 Marvin Demler Award for "sustained and positive contributions to the AIAA goal of advancing education in science and engineering." Cranford is a Fellow of AIChE and a senior member of AIAA.

Alma Martinez Fallon, MEM (engineering management) '99, completed her one-year term as the 41st president of the Society of Women Engineers (SWE) this past August. SWE is an educational and service organization with more than 17,000 professionals, students, and corporate members. Fallon more recently received another honor. In October 2004, the Hispanic Engineer National Achievement Awards Corporation presented Fallon with its Community Service Award for her contributions to the achievements of Hispanics in engineering, science, technology, and math.

Rebecca (Becky) Grasser, BS (computer engineering) '94, is an associate professor of information systems at Lakeland Community College in Kirtland, Ohio. She is working on her dissertation and hopes to complete the doctor of engineering degree at Cleveland State University in December 2005. In April of 2004, she passed the Principles and Practice of Engineering Exam (PE). Her home email is: rgrasser@acm.org.

James Harris, D.Sc. (operations research) '03, received the U.S. Air Force Mid-Career Scientist of the Year Award in 2004. He was selected from a pool of potential candidates from areas as diverse as mathematicians, physicists, chemists, biologists, engineers, operations research analysts, and others. Harris also won another U.S. Air Force award in 2003, when he was selected as the Analyst of the Year.

Mark V. Hughes, III, BA '69 and MS (computer science) '77, has been promoted to group president at Science Application International Corporation (SAIC). Hughes was formerly a sector vice president with SAIC.

Anngienetta Johnson, MS (information systems management) '92 and D.Sc. (engineering management) '03, has been promoted to assistant chief engineer at NASA's headquarters in Washington, D.C. She is responsible for overall office planning and manages departmental support projects.

Pradman P. Kaul, BS (electronics) '67, was elected last year to membership in the National Academy of Engineering.

Richard Moore, D.Sc. (medical engineering) '70, is a senior scientist at the U.S. Department of Energy in Idaho Falls, Idaho. He has published 135 papers in science journals, is a Fellow of the American Association for the Advancement of Science, and is a member of the Royal Society of London, the American Association of Physicists in Medicine, and the Health Physics Society. Moore also has a NATO Senior Scientist Fellowship.

Arthur Pantelides, MEM (engineering management) '02, is vice president and general manager of MG Minigears in Virginia Beach, Virginia. He greets everyone from the Hampton Roads Center in Virginia.

Andre Rogers, BS (computer science) '88, is one of three friends who met at GW and jointly founded Enlightened, Inc. in 1999. Since its founding, Enlightened has grown by 550%, and last year was named by *Inc.* magazine as one of the fastest growing private companies in the U.S. Enlightened, Inc. is an information technology and business solutions company.

Tarek Sabry, MS (telecommunications and computers) '98, has obtained the most recognized industry certification in computer networking and has been appointed Cisco-certified Internetworking Expert #9402. Sabry is a senior network engineer at Schlumberger in Houston, Texas, where he designs and implements MPLS global network solutions for the oilfield industry.

Michael Souryal, D.Sc. (electrical engineering) '03, was awarded a National Research Council postdoctoral research associateship in March 2004 at the National Institute of Standards and Technology (NIST), Gaithersburg, Maryland. During his two-year associateship, Souryal will be conducting research on wireless ad hoc networks in NIST's Wireless Communication Technologies Group.

Andrew Steere, BS (civil and environmental engineering) '99, currently lives in Atlantic Beach, Florida, and is married to Mardi Steere. Steere is an active duty submarine officer in the U.S. Navy, serving as a strategic nuclear command and control instructor. He will retire from active duty in June 2005 and move to Adelaide, South Australia.

Ben Torreon, MS (engineering management) '99, has been promoted to a higher grade management analyst position at the U.S. Department of Homeland Security, Federal Emergency Management Agency, Mitigation Division, Strategic Resources Management Branch. He has also been promoted to Commander in the Naval Reserves.

Russell L. Werneth, MEA (engineering administration) '77, is the extra vehicular activity (EVA) manager for Hubble Space Telescope servicing missions at NASA's Goddard Space Flight Center in Greenbelt, Maryland. Werneth is also the district director for GW's chapter of Tau Beta Pi, the national engineering honor society.

Ya-Qin Zhang, D.Sc. (electrical engineering) '89, has been promoted to Microsoft global vice president at Microsoft Corporation's Mobile and Embedded Devices Division, where he oversees research and development of Windows Mobile software for Pocket PCs and Smartphones and Windows Embedded operating systems. Zhang previously served as the managing director and chief scientist for Microsoft Research Asia.

In Memoriam

Bruce Dalton, Graduate Certificate in Systems Engineering '02, passed away suddenly in late 2003. Bruce was an employee of Science Applications International Corporation (SAIC), where he served most recently as the company's FDLE program manager. From 2001-03, Bruce participated in the master of science degree program that SEAS offered via distance learning to selected SAIC employees. He is survived by his wife Barbara, his son Brian, and his daughter Brandy.

Morton Gertler, BS '40, passed away on November 15, 2003, at his home in Boca Raton, Florida. He was a naval architect who is recognized for designing and testing such high-speed submarines as the Albacore and for developing, together with Alex Goodman, the Planar Motion Mechanism, which allowed for greater maneuverability, stability, and safety in advanced submarines. He is survived by his wife Pearl, three children, and four grandchildren.

Daniel Roy Cheney, MS (engineering management) '03, passed away on December 5, 2004, at his home in Fairfax Station, Virginia. A former Navy lieutenant and computer software engineer, Daniel had worked for Titan Corporation and its predecessor company since 1983. He rose to vice president of enterprise services and solutions while helping to build computer programs for the firm's defense agency clients. He is survived by his wife Susan and two sons.

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