BY GEORGE!

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A Start to Life-Long Learning

Grads Honored at GW's 2004 Commencement Celebration on the Ellipse

BY THOMAS KOHOUT

As if on cue as the fanfare signaled the start of GW's 180th Commencement, early morning showers gave way to a brilliant sunny day as the University conferred 5,500 degrees during the May 16 ceremony on the Ellipse. The crowd of roughly 20,000 graduates, friends and family listened attentively as noted oncologist Dr. Luther W. Brady, Director of the Folger Shakespeare Library Gail Paster, Nobel Prize winning physicist Leon Lederman, and the former Chair of the Joint Chiefs of Staff retired

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Claire Duggan

President Stephen Joel Trachtenberg looks out at the 20,000 graduates, parents and guests on a sun-drenched Ellipse during the 2004 Commencement ceremony. For complete transcripts and photo galleries of the week-long celebration, visit the GW News Center at **www.gwu.edu/~newsctr/newscenter/commencement04/home.html.**

GW Launches Innovative Arabic Studies Program

In response to the increasing need for fluent Arabic speakers in both public and private circles, the GW Classics Department and the University Honors Program have launched an innovative summer Arabic studies program for honors students. The Margaret and Edward Gnehm Summer Honors Program in Arabic Language Studies provides a full-tuition summer grant

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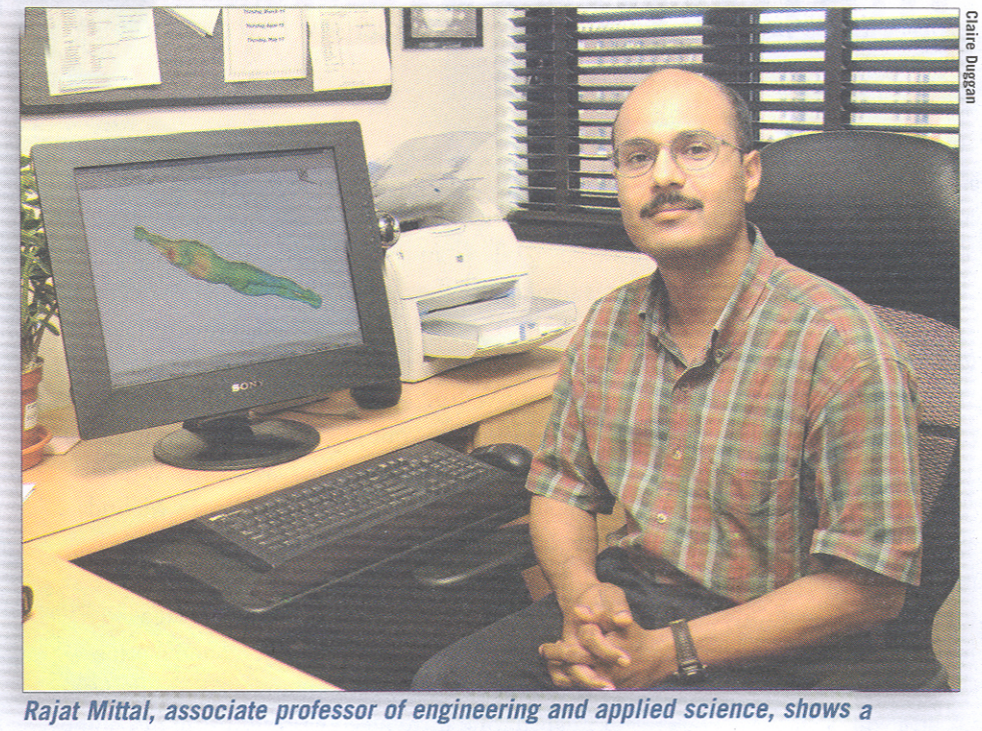
To Win Gold, US Swimmers Must Go with the Flow

GW Flow Dynamics Researchers Work with USA Swimming to Improve Future Olympic Team Performances

BY MATT LINDSAY

The gun sounds and lean, muscular figures plunge into the water. They vanish beneath the surface, kicking their legs in unison and moving swiftly underwater with an ease that belies the furious effort exerted. The crowd roars, but for the figures below all is silent. Precious seconds pass, and finally heads begin to break the surface. One head emerges in front of the rest. This margin is perhaps in the hundredths of a second — but in Olympic swimming that is often enough to turn silver into gold.



Claire Duggan

Rajat Mittal, associate professor of engineering and applied science, shows a computer model representing the areas of drag on a swimmer.

GW engineering professors are using their expertise in computational fluid dynamics (CFD) and computer animation and visualization to ensure that US athletes are using the most efficient swimming techniques to help bring home the gold from the 2008 Olympics in Beijing. GW's Flow Simulations and Analysis Group (FSAG) is researching water flow past a swimmer and the effectiveness of typical swimming strokes. The goal is to help find the perfect stroke that maximizes thrust and minimizes drag, giving the US a competitive advantage and improving the medal count for US swimmers in future Olympics.

"For the first time, we are really trying to introduce a big component of cutting-edge science into competitive swimming," said Rajat Mittal, associate professor of engineering and applied science in the Department of Mechanical and Aerospace Engineering, who leads the project along with James Hahn, professor of engineering

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Strategic Comparison

GW Sets Baseline To Evaluate Strategic Initiative

BY THOMAS KOHOUT

This summer, a team of representatives from all reaches of the University will work to gather information on the 99 performance measures cited in the Strategic Plan for Academic Excellence.

The plan, which was approved by the Board of Trustees last year, established six goals for the University: move solidly into the ranks of first-tier institutions through quality undergraduate education and selected, top-ranked graduate programs; enhance graduate education; move into the top-echelon of research institutions; continue

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and applied science in the Department of Computer Science, from the Institute for Computer Graphics.

Interestingly enough, the genesis of the collaboration between USA Swimming and GW's FSAG stems from previous research into how fish, not humans, maneuver through the water.

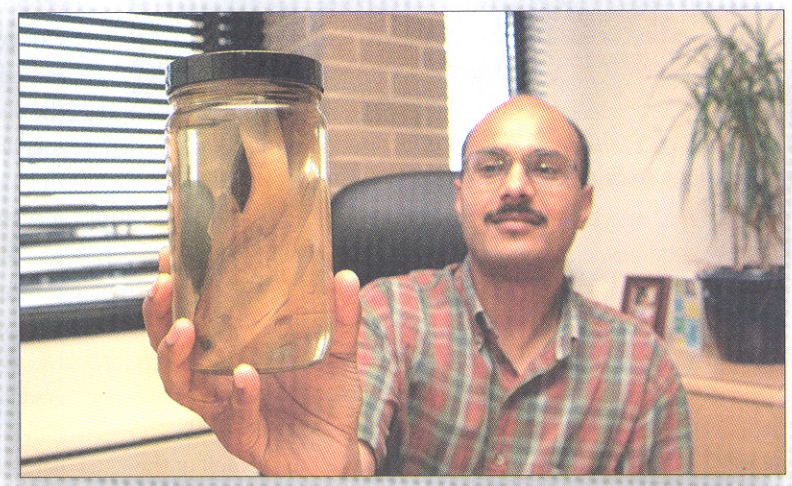
More than a year ago Mittal began work with researchers from Harvard University and MIT on a project for the Office of Naval Research (ONR). The goal of that research is to design mechanical pectoral fins, much like those of a fish, and attach them to autonomous undersea vehicles (AUVs) to provide the vehicles with greater maneuverability and stealth characteristics. The Navy uses AUVs during reconnaissance missions, such as mine sensing. A Harvard zoologist is working with the actual fish and GW is building and testing computer models of the pectoral fins to analyze their fluid dynamics. After conducting their portion of the research, GW and Harvard will provide the ideal size and dimensions of the pectoral fin to MIT, who will build a working prototype of the fin.

The ONR work got Mittal to thinking. "I asked myself, is there something else we can use this research for that will not only be interesting but will capture the imagination of our undergraduates?" Mittal recalled. Given the fact that fluid dynamics of fish swimming has many commonalities with the fluid dynamics of human swimming, he decided to see if USA Swimming had any interest in pursuing such research. As it turns out, Mittal's timing could not have been more perfect.

Mittal contacted USA Swimming and was directed to biomechanics coordinator Russell Mark. "My face lit up when Rajat called," Mark laughed. "It was really fortunate Rajat got in touch with us because the capabilities he had were exactly what we were looking for."

In recent years, USA Swimming has conducted some limited scientific research into fluid dynamics. With countries including Japan and Australia and companies like Speedo beginning to undertake more sophisticated scientific research, USA Swimming wanted to move forward with its own study, even though large-scale research projects are not commonly conducted in the swimming world. However, after analyzing the previous experience and research capabilities of GW's FSAG, USA Swimming decided to move forward with the project. As Mark put it, "USA Swimming has always supported this project, knowing that it has more potential to influence the sport of swimming than any research in decades."

Both parties agreed to focus the research on the dolphin kick, the name given to the leg motion swimmers use underwater at the start of a race, when they keep both of their feet together and kick their legs up and down. While there is a good possibility USA Swimming will eventually expand its research to study different strokes and then the whole body, the dolphin kick provides a good starting point for two reasons. First, the fluid dynamics of the dolphin kick are easier to study since this stroke occurs away from the water's surface, which increases the chances that the results of the research can be incorporated into the US training regimen prior to the 2008 Olympics. Secondly, the dolphin kick is such an important component of competitive swimming. As Mark pointed out, in a 100-meter race up to 30 percent of the total distance can be covered while the swimmer is underwater using the dolphin kick.



Photos by Claire Duggan

Left and below, Mittal shows a fish used to research new designs for mechanical pectoral fins, much like those of a fish, for autonomous undersea vehicles used by the Navy during reconnaissance missions.

At the initial stages of the research USA Swimming provided full-body laser scans of top US swimmers Lenny Krayzelburg and Gabrielle Rose and a video of record-setting University of California swimmer Natalie Coughlin's dolphin kick. Yet, Mittal and Hahn had to combine the information provided by the static three-dimensional shapes from the laser scans with the motion given by the two-dimensional video to generate a moving three-dimensional virtual swimmer. "Our challenge was to make the video come alive as a three-dimensional object," Hahn explained.

To do so, Hahn inserted a digital skeleton into the body scan, and matched the video frame by frame to equate the movement of the full-body scan with Coughlin's movement in the video. This process, called "motion capture," is similar to the techniques that are used to develop animated movies in Hollywood. Hahn had created a 3D computer model that could be made to move like the real swimmer and can be studied in ways that a traditional video image could not.

Using his experience working with fish, Mittal has been able to simulate flow past the body scans of Krayzelburg and Rose. Yet, there are many different movements and body positions involved in swimming that remain to be studied. In order to provide USA Swimming with the best information, Mittal and Hahn are coordinating their work with researchers at Rutgers University, who are handling the experimental components of the project.

However, this research is very complex and there is much work to be done. While the dolphin kick may seem relatively simple, using computers to create a lifelike animated model and studying the fluid dynamics surrounding that model is not a simple process. The various components of this project, especially the elaborate simulations, will require thousands of hours of processing time on the FSAG's supercomputers.

Even after several years of study and analysis, Mittal and Hahn do not expect to have all the answers for every swimmer. Intangibles such as an athlete's psychology and motivation can impact performance in ways that computers can never hope to model or predict. "There will always be some level of individuality in terms of physiology, body type and strength, but there is more commonality among great swimmers," said Mark.

Mittal believes that in the long-term, "a stroke should really be customized to an athlete based on body size and structure."

USA Swimming eventually would like to see all athletes benefit from the research and knowledge about the optimal stroke techniques. In the near future the proving ground for this research will be leading up to and during the 2008 Olympics. "The only way this analysis is a success is if it's applicable," said Mark. "This is not just a science project; we are really trying to have an impact."

What kind of impact this research has will be seen on the medal podiums in Beijing.

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for Development Policy. "I think it was the realization that we were lagging and failing to reach the poorest that made the people in the UN and intergovernmentally to say, 'Let's do something about it. Let's reenergize our commitment to those things.' That is where the millennium development goals came from, this was the motivation."

The role of NGOs in meeting these goals was discussed during the two-day conference through the lenses of economics, public administration, globalization and health, among many of the breakout session discussions.

GW INGOT was founded by Jennifer Brinkerhoff, associate professor of public administration and international affairs; Stephen Smith, professor of economics and international affairs; and Hildy Teegen, associate professor of international business. Their goals, explained Donald R. Lehman, executive vice president for academic affairs, center around a common research focus of how NGOs impact development and poverty alleviation.

"Given the complexity of the problems we find in our global society today, it is clearly essential that the intellectual capital that is available in all the relevant disciplines be involved in developing solutions," Lehman said.

A Class-*y* Gift

This year, GW seniors gave back the gift of reading through the annual class fund that supported new books for the University's library system. More than 1,000 seniors voted to choose a library endowment as the class gift and in the end, more than $27,000 was raised, $2,000 more than the goal. A book plate designed by GW Graphic Design will go into each book purchased through these funds.

"This is really a gift that is going to have a lasting impact on the University," said Joe Bondi, director of alumni constituency initiatives. "The students wanted to go with an endowment fund in the hopes that people will continue to contribute to it and the endowment will last in perpetuity."

Six Selected for 2004 Bender Awards

Six faculty members will be recognized this fall for their

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