CIVIL and ENVIRONMENTAL ENGINEERING

UPDATE

Spring 2009

RESEARCH THAT MATTERS

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FROM THE Director


Len Lion

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Spring 2009

Greetings alumni and friends!

Borrowing from the Grateful Dead (at the risk of showing my age): "Lately it occurs to me what a long, strange trip it's been." After 27 years at Cornell, I find myself sitting in the director's office in the School of Civil and Environmental Engineering. When I look around at the school's distinguished faculty, exceptional staff, outstanding students, and successful alumni, I sometimes feel the need to pinch myself to make sure I'm really here.

It doesn't seem long ago that I was negotiating my starting salary with Professor Arnim Meyburg, who at the time was chair of the school's Department of Environmental Engineering. Fast forward and in October 2008 I was emcee for Arnim's retirement celebration. For roughly a decade after I came to Cornell I was the "newest hire." Now, as I look at the demographics of the CEE faculty, it seems clear that (economics permitting) there will be many new hires to come. When I stepped into the director's office in July 2008, the school was in the midst of a search for a new faculty member in transportation systems engineering. I suppose you could think of this person as Arnim's replacement, but no one can ever really replace him. Unfortunately, our search has been paused as the university and the College of Engineering make budgetary adjustments to reflect the new financial climate, but we hope to resume it soon.

With the ongoing economic crisis an ancient Chinese proverb (some say it is a curse) seems very applicable: "May you live in interesting times." Budget cuts have rippled through both the statutory and the endowed sides of Cornell, and the College of Engineering has not been left unscathed. I take improving what we do as a school in these "interesting times" as an achievable challenge. Progress in research will continue, and we will keep working at the cutting edge. Paradigms for effective teaching will evolve, and our cadre of faculty will continue to be award winning. Our undergraduates will continue to be highly sought by graduate programs and firms, and our graduate students will continue to make contributions that advance their fields and go on to join academic faculties or research-oriented organizations.

My time in the director's chair will be short. Beginning July 1, 2009, Professor Phil Liu will take over and he will be writing this letter to you next year. Directors come and go, but the essence of Cornell is constant. If you recall your time at Cornell, the people you knew, the professors you had in class, I think the continuity of quality between then and now emerges. If you remember the hard work, sweat, and (dare I say it) good times you had while here, the unique benefit of being a Cornellian comes to mind. If you think about what you and your classmates have accomplished since leaving Cornell, then you too may end up pinching yourself.

Best wishes.

Leonard W. Lion

Director

Engineering Learning Initiatives

Grants Provide Undergraduate Research Opportunities

"At one time the big question was how to interest women in teaching and research careers in engineering," says Edwin (Todd) A. Cowen, associate professor and director of the DeFrees Hydraulics Laboratory, referring to the not-too-distant past. "Now it's how do we retain any U.S. citizen?"

Giving undergraduates research opportunities early on is one answer.

"Ninety-eight percent of our undergrads have not been exposed to a family member or a peer who has been through a graduate science program," notes Cowen. "So, giving them the opportunity to tinker, to play with research, is the way to open their eyes to the possibilities of continuing down a path of exploration or of teaching the fundamentals."

Each year the College of Engineering's Engineering Learning Initiatives (ELI) program provides funding that supports research participation for 100 undergraduates. Here's what five in CEE are doing this year.

When **Tim Phillips '09** got excited about research little did he think it would give him a chance to initiate citizen science. But that's what happened.

His first taste of the research atmosphere occurred in two of Cowen's courses designed to pique students' interest: Fluid Mechanics and Experimental Methods in Fluid Dynamics. These classes allow students to develop laboratory skills comparable to those of a beginning graduate student. Phillips enjoyed the courses so much he asked Cowen if there were possibilities for more laboratory work. Impressed with Phillips's abilities and enthusiasm, Cowen hired him to assist graduate students with projects in the lab (on acoustical methods for measuring flow) and in the field (collecting data on Cayuga Lake in support of the City of Ithaca Water Resources Council). With proven success in both domains, Cowen applied for a two-part ELI grant so that Phillips could continue work on improving the accuracy of a measurement technique involving acoustic Doppler velocimetry (ADV), used in the ongoing cleanup of Onondaga Lake. The funding also put Phillips's experience on the lake in the service of the Cayuga Lake Floating Classroom.

"Professor Cowen is a really great guy who goes out of his way to help students learn and to make Ithaca a better community, so there is no way I'd pass up working another semester for him," Phillips says. What's more, while the indoor work was satisfying, Phillips is passionate about his time on Cayuga Lake. A son of two public school teachers, he grew up in a small town named Stormville in the Hudson River Valley. He expects one day to follow in their footsteps but first to put his civil engineering degree (with a concentration in environmental fluid mechanics and hydrology) to work in the field.

"Many times in my education I've had trouble sustaining a passion for what I'm doing because science is often divorced from human endeavors," Phillips explains. "But this project is a chance to explore how what I'm studying intersects with community involvement and to promote Cayuga Lake's well-being."

Phillips will get his feet wet on board the Cayuga Lake Floating Classroom where he'll teach students from kindergarten through high school how to take water temperature and turbidity readings at depths greater than 40 m. The data will be used to create a turbidity profile, which is a key indicator of water quality. While on board Phillips will teach students some physics of the lake and also discuss data collected by classes earlier in the week that have been posted on the Cornell Cayuga Lake Research web site.

"The premise is that you put on a show that will arouse enough student interest that they'll carry it with them beyond their few hours on the water, and at the same time you are contributing to the greater scientific knowledge of the southern portion of Cayuga Lake," says Phillips, noting that the classroom's data will be contributed to an ongoing multifaceted monitoring program consisting of government and science-based community organizations. "Never before have youth been involved, so we're showing that no child is too young to help study the lake."

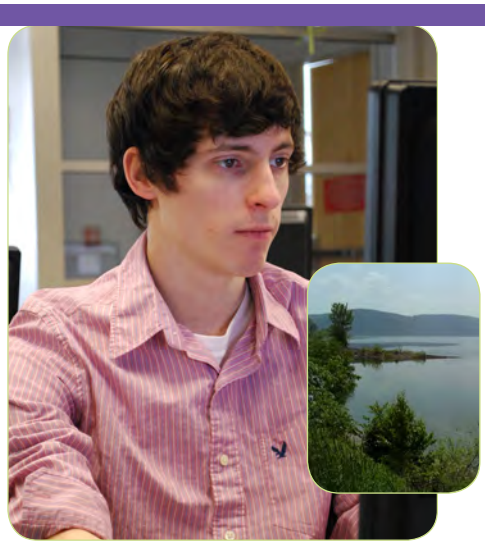
Cowen hopes to continue to grow this involvement with the on-board classroom: "[Tim] is setting the stage for something that might become a bigger outreach component of our partnership with the local community in learning more about the lake . . . . Tim is really helping to initiate citizen science."

Another senior, **Paul Muller '09**, who grew up outside Philadelphia, is helping safeguard the quality of New York State's waters in an entirely different way. Muller loves writing computer

continued

"One of the reasons I chose civil engineering is that it has to do with civilization, with human beings living with one another in communities."

Tim Phillips



"I would definitely recommend anyone interested in research to get involved—if they're not sure they want to go on to grad school it could help them make a decision."

Paul Muller

code. and is putting this skill to work on a project to protect the groundwater in the Cannonsville watershed from a buildup of phosphorus. Phosphorus promotes the growth of algae that could eventually require New York City to invest upward of $8 billion in a treatment plant to filter most of its drinking water.

"Paul was very reserved, he didn't say anything, so I kept wondering who was this person who had the highest grades in my class," says Christine Shoemaker, the Joseph P. Ripley Professor of Engineering. She found out not long after the course Engineering Computation ended when Muller e-mailed her to say he'd enjoyed what they had done so much and asked if there were a way that he could continue.

"I immediately wrote him back to see if he could work for us as a programmer," says Shoemaker, who is devising reliable models of the impact of differing land-use practices (primarily agricultural ones) on phosphorus levels in the watershed. "Many people don't like to do programming, so it's exciting when someone offers to program who also has shown he or she is good at it. I'm very grateful for the work Paul did for us; he was truly useful."

This past summer Muller was awarded an ELI grant to enhance the efficiency of the modeling tool called SWAT (Soil and Water Assessment Tool) in conjunction with an optimization algorithm (DDS) developed in Shoemaker's research group. Muller converted thousands of data files and code from SWAT2000 to a newer version called SWAT2005. With the proper algorithms SWAT2005 can be run on parallel computers, so Muller did that, too.

"I had to learn the functions and how to set up the parallel runs and then rewrite the algorithms changing the functions and simplifying it at the same time so as to make it all more efficient," Muller explains. "This was a big benefit to the project and a good foundation for me. To write algorithms is a good exercise for trying to figure out how to solve any engineering problem."

Another benefit Muller says he got out of the experience was to see how research groups work. "One of the main reasons I wanted to do undergrad research was for networking and to figure out what goes on between professors and graduate students and others who do research for faculty members," Muller explains, saying he thinks it would be handy to know before he heads off to grad school.

Getting this taste of the sociology of research is very enlightening, Shoemaker notes.

"A lot of the benefit is being in the research culture and beginning to understand the enthusiasm and excitement people feel who do research," Shoemaker says. "And the other important part is to see that it's not so mysterious. The undergraduate researcher might not understand the whole project, but it's made up of many parts and some of those parts the undergraduates are really quite capable of doing. So the experience helps them to understand if research is something they want to do and to what extent they could see a long-term future in it."

Nathaniel Erwin '10 discovered assistant professor Derek Warner's research in the area of modeling deformation and fracture processes when he was looking through the CEE faculty web site for intriguing research topics.

"I knew there was a grant through Engineering Learning Initiatives, so I e-mailed several faculty members I thought I might like to work for and Derek got right back to me; he was incredibly enthusiastic," recalls Erwin of his first encounter with Warner more than a year ago now.

Warner suggested the idea of creating a databank where researchers could "deposit" interface structures as they discovered them. Analogous to the biological community's protein structure databank that allows researchers to easily share the structures of proteins, the interface structure databank would aid researchers involved in the characterization of the mechanical, electrical, and thermal properties along the atomic interfaces between individual crystals within a material.

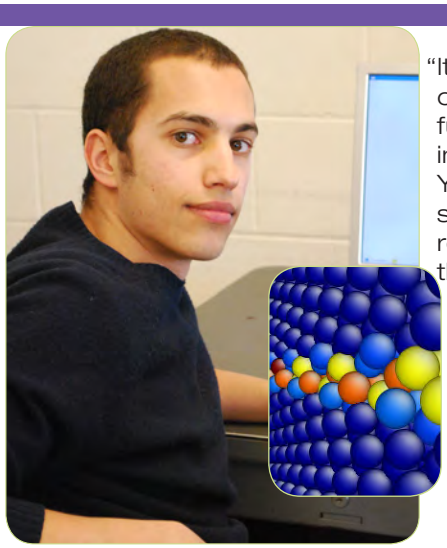
"As nanotechnology pushes to create structures and devices with nanometer dimensions, the role of interfaces in materials becomes much more important," notes Warner. "Before we can hope to predict the performance of these tiny structures, we must gain a better understanding of material behavior at these scales, thus we must understand atomic interface structures."

Investigating these interfaces, of which there are millions, is difficult to do experimentally but ideal for computer modeling (in which the interfaces are expressed in coordinates of atoms). Although Erwin, a native of Harrisonburg, Virginia, and just a sophomore at the time, had little experience in web design, he applied for a grant to work on it 30 hours a week the following summer.

"I'm not a materials researcher and haven't had some of the advanced courses, so I had to read research articles and follow references to figure out how to organize the database so that it would be useful," recalls Erwin, who by using online tutorials in web design had a workable database completed by midsummer.

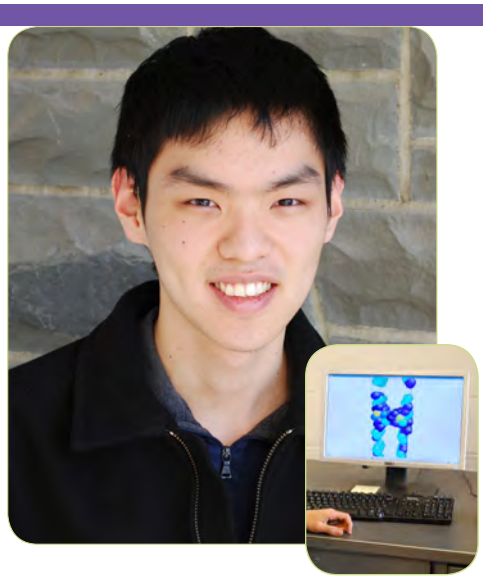
In the fall, sophomore **Eugene Wang '11** joined him and was set to work developing a program to automatically collate and process new structure properties from raw simulation data into a standardized format for the databank. Under Erwin's guidance, Wang will populate the database with structures created by the team's own computer simulations and researchers from around the world and begin to explore the potential of grid computing for finding structures. They'll be using what's known as the HIVE, a cluster of supercomputers on the fourth floor of Hollister Hall.

"We might run thousands of simulations on 50 processors at a time to simulate just one



"It's very nice to have a project to work on that's going to be used way into the future, a sense of responsibility and involvement in something that is real. You don't get that in the classroom so even if you aren't interested in the research, the experience is valuable in that way."

Nathaniel Erwin



"Our aim is to increase efficiency and minimize overlap of effort; once a new structure is discovered it can be put online and shared."

Eugene Wang

structure," explains Wang, a U.S. citizen who grew up in Taiwan and immigrated to California as a teenager. "This is a very good opportunity for undergrads to use such expensive equipment."

Initially studying mechanical engineering, Wang switched to structural as a result of his experience working with Warner.

"I really enjoy working with Derek because of his personality—he's always there when you need help, but he gives you a lot of space to try to figure things out on your own," Wang says. "And the grad students are a good source of help, too, because they are always there!"

Warner says of Wang, who he hopes to continue mentoring throughout his undergraduate years, "I'd love to have him in graduate school because he has all the qualities of a fine scientist."

With Wang shouldering much of the responsibility of the databank, Erwin, who Warner describes as "consistently demonstrating an appetite for moving toward more complex task and analysis," is free to take on one of the roadblocks to a physics-based mechanical modeling of materials: determining whether the "E unit" is a simulation artifact.

"Interface structures that have this E unit have significantly different mechanical properties from structures that don't," Warner explains. "Nathaniel will be using more robust methods to generate structures to see whether the E unit is actually a real thing; it's definitely a more advanced project than I would normally start an undergrad with."

Sarah Long '09, a native of Richmond, Virginia, knows first hand that undergraduate researchers can spot the real thing. She saw her own design in action in a water treatment plant in Honduras while visiting there over winter break. Long is a member of AguaClara, the student-led organization with a mission to improve water treatment technologies and provide training so that communities in developing countries can own, operate, and maintain safe drinking water supply systems.

Before she got into parts design, Long was a member of the outreach committee where she helped spread the word about how young people can contribute to solving the global shortage of safe drinking water. As a junior she took the design course Small-Scale Sustainable Water Supply in which she wrote computer code for the design of flocculators, rapid mix systems, and more. And there it was—albeit a bit different from the original plan—doing its job in a water treatment plant in the town of Marcala, which has more than 12,000 residents.

"Regardless of whether students go into a research career or not, undergraduate research prepares them to deal with the longer-term, more difficult problems they'll encounter as a practicing engineer."

Derek Warner

The visit had a big impact on her.

"People were so welcoming—little kids ran up and kissed us and thanked us for giving them clean water," says Long, who has received a one-year internship to return to Honduras to learn more about the technical obstacles of installing water treatment systems there before continuing on to graduate school, ultimately, a PhD in civil engineering specializing in water systems.

"Sarah has that appealing combination of being able to work hard and play hard," says Monroe Weber-Shirk, a senior lecturer/research associate who is the founding director and advisor to AguaClara. "She's very willing to be in new situations, take on new challenges, dive into new activities, and participate fully."

The challenge of Long's senior year for which she was awarded the ELI grant is to supervise several other undergraduates in designing and testing a bench scale water treatment plant in which they'll vary the spacing between plate settlers, devices used in the sedimentation process to remove particles that make the water cloudy and unsafe to drink. Finding the right spacing between the 60 plates in a sedimentation tank is critical in keeping down the cost of building it while optimizing its operational performance.

"When there's a research project like this where students can understand why it matters, why it makes a difference and when they realize that the edge of knowledge is not that far away, that there is something they can do to help further exploration, it really fires them up," says Weber-Shirk.

Starting from scratch in September, Long and her team had a sophisticated, fully automated apparatus up and running three months later. Initial data proved promising. After returning from Honduras, Long and her team conducted a series of highly controlled experiments to determine a failure mode—when the spacing is so small the system no longer works. Ultimately she hopes to publish her findings in a peer-reviewed scientific journal.

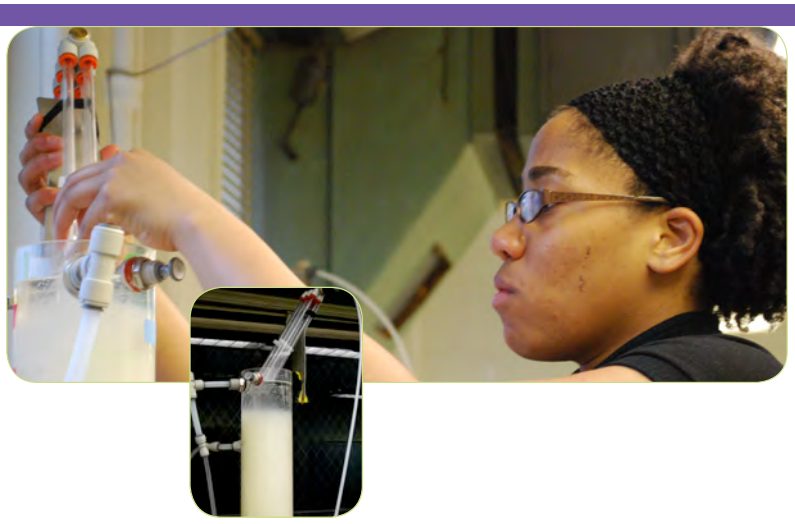
Long says doing research has enhanced her undergraduate experience immeasurably, that it's helped her understand the theory she's learned in courses to the extent that she can think creatively about it.

"I'm a strong believer in giving students the tools so they can generate knowledge themselves," Weber-Shirk says. "One thing the planet needs is a lot more information about many different things, so the ability to generate your own knowledge is a powerful tool."

Metta Winter

"I'm really grateful to have received the grant, to have the opportunity to be part of a project that has such a huge impact. It's an honor to have someone implement something I thought of."

Sarah Long



Graduate Research Symposium

The CEE Graduate Student Association (CEE GSA) organized the first ever graduate research symposium held on January 23, 2009. This event, expected to reoccur annually, showcased the diverse range of research being carried out in the school.

Fourteen oral presentations and a poster session allowed faculty and students to view and ask questions about the projects. At the end of the day, prizes were awarded to first-, second-, and third-place winners of papers and posters.

Below we highlight four projects of graduate students who presented at the symposium.

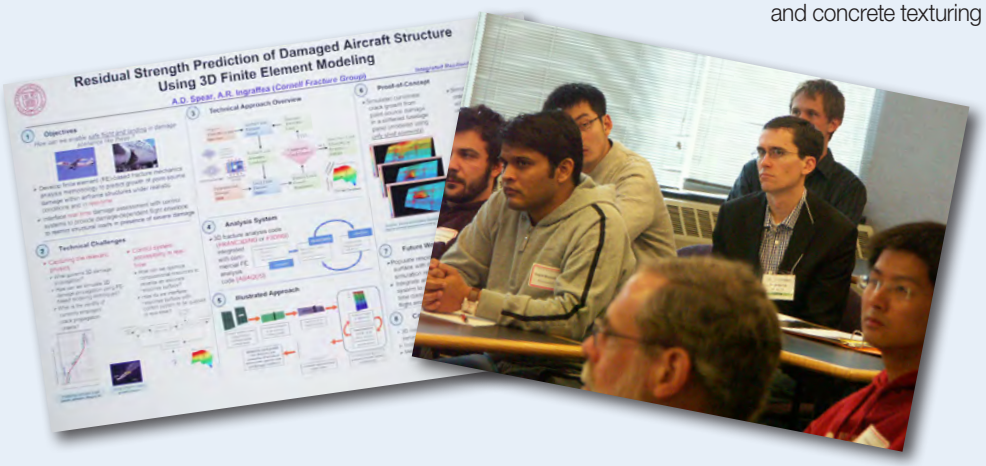
Allison Reilly, a PhD candidate in civil infrastructure systems, researches the macroscale system of transportation networks. In 1998, the U.S. Department of Transportation estimated that one in five trucks hauls biohazardous, explosive, or flammable products (commonly referred to as HAZMAT), and predicted a steadily increasing trajectory of HAZMAT transport in the coming years. The current strategy of the U.S. government to minimize community losses by a planned terrorist attack on a HAZMAT vehicle is to close the roads that have the largest surrounding population or infrastructure. The purpose of Reilly's research is to develop alternative road closures that further lessen the expected damage on a community while also possibly decreasing the cost for the HAZMAT trucker. Game theory is used to model the opposing objectives of terrorists and HAZMAT truckers and the ability of the government to close roads to HAZMAT trucks. A better set of road closures encourages HAZMAT trucks to take advantage of multiple alternatives, equally cost-effective routes, which in turn means fewer HAZMAT trucks traveling on highly populated roads.

Annette Rowe, a PhD student in environmental processes, examines the difficulty of monitoring the degradation of pollutants (e.g., chlorinated organic solvents like TCE and PCE), in environmental systems. In groundwater in particular, it is difficult to distinguish compound disappearance by diffusion with removal via biological remediation or degradation. The goal of Rowe's research is to develop ways to determine if biological remediation is occurring. Biological remediation of chlorinated organic compounds occurs through a bacterial metabolism known as reductive dechlorination. Rowe's research examines these processes in a mixed community—similar in microbial composition to environmental systems. In her experiments, Rowe is able to control and monitor dechlorination, while she looks for bacterial bioindicators or molecules that signal degradation is occurring. Her current work focuses on monitoring the abundance of specific bacterial proteins, and/or the messenger RNA that codes for given proteins over a series of dehalogenation rates. She is developing a model that will predict the activity of bacteria that reductively dechlorinate, based on the measured quantity of selected bioindicators.

Emily Guzas, a PhD student in structures, presented a paper titled "Influence of Air Blast Modeling on Structural Response." In the post–9-11 era, it is of interest to understand what happens to structures when an explosion, or blast, happens nearby and the shock wave produced when the blast hits a structure. Air blast loading, the load on a structure produced by an explosion in air, has specific characteristics such as its arrival time at the structure, its duration, and how much energy it imparts to the structure. Guzas has developed software to model air blast loading on structures. This software is derived from unclassified/unrestricted sources and therefore can be used by engineers outside the military. Guzas's research compares the effect of a blast on a structure as modeled with her air blast software versus that predicted by air blast software that is restricted to use by the government and its contractors. Her results show that small differences in air blast modeling translate into significant differences in the effect of air blast on a structure.

Master of Engineering students in the Engineering Management degree program presented a paper about their software program titled "Robust Construction Planning Tool (RCPT)." Project managers who struggle with optimizing the construction of horizontal concrete slabs will appreciate the software program, which simulates the effects of weather, variable travel time, and small batch-to-batch placement of a horizontal concrete slab.

The "RCPT" simulation is based on initial information inputted by the project manager —such as the size, shape, sequence of placing a floor, desirable setting characteristics of the concrete, predicted temperature, time of day to start and end the placement, number of trucks available, travel time to and from the plant, and placement time upon arrival. The program simulates variations on the actual batch-to-batch set time combined with truck-to-truck mix variations and outputs a projected plan, in the form of a grid, that shows the efficiency of placement and any potential problems in parts of the floor. The program will provide recommendations for placement of a higher-quality slab, factors that influence the cost of construction, an estimated construction cost of the placement, cost of placement rate, repair rate (if a section is problematic), lost quad repair rate, and concrete texturing rate.



HYDRAULICS LAB
Collapses into Fall Creek Gorge

A portion of Civil Engineering's Hydraulics Lab located in the bedrock wall by the dam in Beebe Lake has collapsed into the Fall Creek gorge. For those of a superstitious frame of mind, Friday, February 13, was the first sighting that the building was gone. The remaining exposed bedrock is so clean that it appears as if the lost section of the lab structure never existed.

The historic landmark was used by Civil Engineering students from 1898 until the late 1960s. Some of the major discoveries made in the lab are described in the article "Horton, pipe hydraulics and the atmospheric boundary layer" (Brutsaert, W. 1993. *Bulletin of the American Meteorological Society* 74(6): 1131–1139). Of particular note is use of the lab by Ernest William Schoder. His work there made Schoder famous, and his friction experiments are still part of the basis for formulas on resistance to flow in pipes.

Hydraulics Lab in January 2009

Photograph taken after February 17, 2009

Professor Emeritus Jim Liggett, who joined the School of Civil and Environmental Engineering in fall 1961, writes the following:

I suppose that I am the last person alive who actually did experiments in the lab. When I arrived at Cornell in 1961, Professor Marvin Bogema ran the laboratory. He primarily did model studies for various entities, such as determining circulation around thermal power plants that were constructed on rivers or lakes. Prof. Bogema also did commercial testing of hydraulic equipment, mainly flow meters. The income from the model studies and testing provided funds for undergraduate experiments and a bit of research, such as Prof. Bogema's work on quadrant-edged orifices.

When the lab was built, the location afforded the opportunity for high flows at a high head. In later years machinery took over these functions so that the lab's unusual configuration (and its remoteness from Hollister Hall) became more of a liability than a valuable asset. The rickety old stairs, the constantly dripping water, and the lack of heat made the lower floors a pain to use. By the time I arrived at Cornell, the Hollister Hall lab had been built and there was little or no undergraduate activity at Beebe Lake aside from a couple of "show-and-tell" sessions on the models and testing.

Prof. Bogema died in the summer of 1962, just as I was setting up a laboratory project, funded by the National Science Foundation, to measure turbulence and isovels in a right-angle corner. Although I carried on the commercial testing for a short time, it was not what I wanted to do, and funds for research were becoming available from government and private sources. When the turbulence experiments were over, we had pretty much moved everything of value to the Hollister Hall lab (now the DeFrees Laboratory).

SawTeen See '77, MEng '78
THE PATH TO SUCCESS

From the time **SawTeen See** was a child growing up in Penang, an island state of Malaysia, she knew that she wanted to build beautiful buildings. In 2008, her project received the Best Tall Building in the World Award from the Council on Tall Buildings and Urban Habitat (CTBUH); See was partner-in-charge of the Shanghai World Financial Center—at 1,614 feet (492 meters), the tallest building in the People's Republic of China. During the years between, she created structural designs for dozens of iconic buildings in the United States and abroad, rose to majority ownership of a world-renowned structural engineering firm (Leslie E. Robertson Associates, R.L.L.P.), received the highest honor of her professional society (Distinguished Member of the American Society of Civil Engineers), and was named a fellow of the New York Academy of Sciences for her "outstanding contributions to the advancement of science."

> "Women represent only 10 percent of the engineers, at least in my field, yet the country has a great shortage of talented engineers."

The path to all of these successes, and the joy that's gone with them, began when See received a cable sent by the International Students and Scholars Office announcing that she had been awarded a full scholarship to study at Cornell.

"That scholarship changed my life," she says. "I knew that going to college was the only way to get out of a country where there was growing discrimination against minority Chinese, but my family could never have afforded to send me abroad."

Her two older siblings had found their way to schools in Australia. See applied to three in the United States; only Cornell offered a full scholarship.

She arrived on campus with enough advanced placement credits in math and science from her high school in Penang (a technical institute in which only 1 percent were girls) to complete a bachelor's degree in three years (including summers) and then a master's in a fourth. With a final year left on her student visa, See applied for a position as an engineer with Leslie E. Robertson Associates, R.L.L.P. (LERA) at the suggestion of one of her professors, the late Peter Gergely. See was appreciated from the start, and the firm sponsored her application for permanent residency, which was granted in 1980. She became a U.S citizen in 1985.

Gergely knew that See was not only talented in the technical aspects of building design, but the aesthetic side as well. And for that reason he suggested LERA; it was the right match.

"What appealed to me about the firm was that the building designs they were doing were not run-of-the-mill factories and shopping malls but architectural buildings, those of more aesthetic interest and with very well known architects," See recalls.

Creating architectural buildings requires a very different way of working, with a strong focus on the details of the structural members because, when they are exposed, the structure is also the architecture, See explains.

"Structural engineers can have profound impact on how a building looks, the shape of it," she says. "People think that the architect is the master for buildings, but it is becoming more of a collaboration between the architect, the structural engineer, and the building services engineer." And this collaboration is part of the job that she particularly enjoys. The results are landmark buildings that frequently appear on the covers of architectural and engineering magazines.

"I've been fortunate to work with so many great architects," See says. "So it's difficult to single out any person or firm."

Although LERA is associated with tall buildings—See's husband, Leslie E. Robertson, a founding partner, was the structural engineer for the World Trade Center in New York City—she's been involved in projects as diverse as the 37-story J. W. Marriott Tower located in Almaty, Kazakhstan, a high seismic zone, to the six-story new Ambulatory Care Facility for Bellevue Hospital Center in New York City to the $160-million expansion of the Baltimore Convention Center in Baltimore, Maryland, with a 180-x-600-foot column-free space in the exhibition hall.

Among See's current projects is the NASCAR Hall of Fame and Museum in Charlotte, North Carolina, which will open next year. Other museums include the Rock 'n' Roll Hall of Fame and Museum in Cleveland, Ohio, featuring a 50,000-square-foot exhibition space beneath a soaring "glass tent" that engages an offshore eight-story tower containing the Hall of Fame, and the Miho Museum and Bridge in Shigaraki, Japan.

In addition to providing structural engineering design services, See spends some of her time conducting peer reviews. One project on which she had a positive impact was the International Finance Center (IFC) 1&2, at Hong Kong Station, by providing value engineering, peer reviews, and alternative designs for the owner. The 88-story, 1,378-foot IFC 2 tower is the tallest building in Hong Kong.

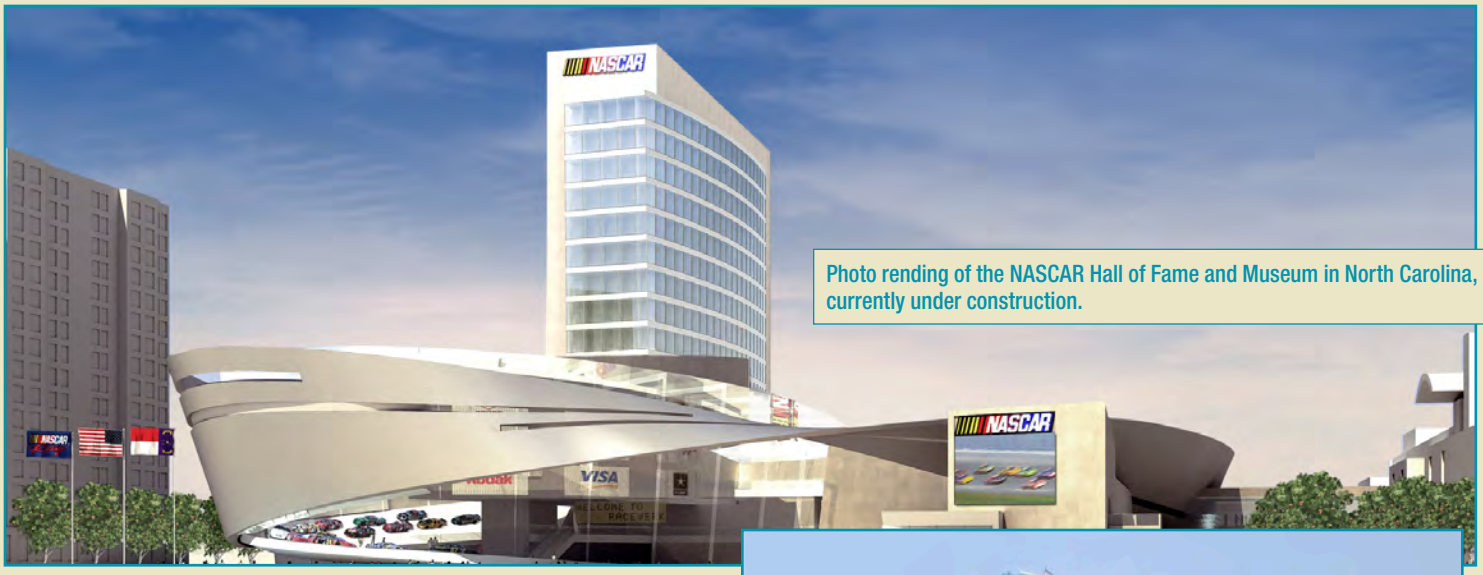


Photo rending of the NASCAR Hall of Fame and Museum in North Carolina, currently under construction.

Because half of LERA's projects are international (as are many of the engineers in the 80-member firm), See spends some of her time on the road, primarily in meetings and reviewing the progress of projects currently under way but occasionally to appreciate those that have been completed. In contrast to other professions, law or banking for example, See takes pleasure in using her mind to design things that last.

"It's very gratifying to be able to touch and experience something you have created," says See, who became partner in 1986 and a 51-percent owner in 1989, resulting in the designation of LERA as a MBE/WBE (minority business enterprise/woman business enterprise). Today, as managing partner, she must fit in the responsibility for the general management of the practice around the demands of her design projects.

And then there is pride in her 24-year-old daughter, Karla Mei Robertson, who graduated from Stanford with a degree in mechanical engineering with a focus on product design. A current project with which Karla Mei has been involved is Palm's newest smartphone, the soon-to-be-available Pre.

"It was announced at the Consumer Electronics Show in Las Vegas in January that it won 'the best of show'," See says. "She's very proud of it."

See's encouragement of young women to become engineers extends well beyond her family. In 2006 she was profiled in a book published by the American Society of Civil Engineers titled *Changing Our World—Stories of Women Engineers.*

"Women represent only 10 percent of the engineers, at least in my field, yet the country has a great shortage of talented engineers," says See. "At home and in the schools, girls are still pushed one way while boys are pushed another," she notes. "So the book is aimed at girls in school, to encourage them to take math and science."

Financial need is often another barrier to young women interested in the field. For that reason, and in recognition of See's own beginnings as a scholarship recipient, she and her husband created the Leslie E. Robertson and SawTeen See Master's of Engineering Student Award Fund in November 2002. Her only stipulation is that the first priority be given to a female engineer. See continues her involvement with Cornell as a member of the Advisory Council of the School of Civil and Environmental Engineering.

"The education I got at Cornell changed my life," See says. "It was the best thing that ever happened to me, particularly with the benefit of the full scholarship."

Shanghai World Financial Center, 1,614 feet tall, in People's Republic of China.

Metta Winter

news student, alumni, and faculty

ASCE News

Among ASCE activities, the **"PPP" Pizza, Professors, and (P)socializing** event takes place once a month at the Nines in Collegetown. PPP offers students and faculty members an opportunity to talk and get to know each other in a nonacademic setting.

This year's **ASCE Regional Conference** will be hosted by SUNY Buffalo on April 17–18. The headline events are the concrete canoe (see photo above) and steel bridge competitions, but SUNY Buffalo has also planned several other events and competitions, including a concrete Frisbee challenge. This year, in an effort to raise awareness of environmental issues that civil engineers face, the rules for building the concrete canoe require that the aggregate be at least 25 percent recycled.

ESW News

ESW Cornell submitted an entry titled "Therma' Mia" to the 2008 Climate Witness Challenge. The club also created a short video in which students measured heat loss from windows in the Donlon and Jameson residence halls, and then calculated energy savings that would be realized if single-pane windows were replaced with double-pane windows. The video is posted on *youtube.com*. The project is continuing with a case study of Olin Hall, which is currently being renovated.

The ESW Amanecer solar oven team is testing new designs that we hope will accommodate more cooking vessels as well as larger ones. The scale dependence of oven performance is being tested as is wind-induced heat loss. Some team members will fly to Nicaragua over spring break to build ovens and discuss the project with Groupo Fenix and the Solar Women of Totagalpa, who are the intended recipients of our findings at Cornell.

ESW National is expanding rapidly. New chapters are springing up all over the country. ESW Cornell, as the founding chapter and one of the more established ones, is now the mentor for Washington State's newly founded ESW chapter. ESW Cornell welcomes ESW Washington State and looks forward to working with them.

Students

Michael Shearer '09 is the recipient of the 2008 Katharine and Bryant Mather Scholarship from ASTM International. The scholarship, sponsored by ASTM Committee C09 on Concrete and Concrete Aggregates, is presented each year to undergraduate or graduate students who are pursuing degrees specializing in cement or concrete materials technology or concrete construction.

Ryan K. Walter '09 is the recipient of the New England District Chi Epsilon Scholarship for 2009, in recognition of his outstanding academic work, enthusiasm, excellent involvement in extracurricular activities, in particular in Chi Epsilon.

Alumni

Greg Fenves '79 was named dean of the Cockrell School of Engineering at the University of Texas in Austin.

Veronica W. Griffis MS '03, PhD '06 has joined the faculty in the Department of Civil and Environmental Engineering at Michigan Tech as the Donald and Rose Ann Tomasini Assistant Professor of Water Resources Engineering.

Emmanuel Asaba Katabarwa MS '08 came to Cornell as a Fulbright Scholar from Rwanda. He was hired by Kittelson and Associates, a transportation engineering firm in Portland, Oregon, that has recently established a foundation to help fund Rwandan students in continuing their education.

Elias S. Mater '88, MEng '89, MBA '90 was recently promoted to partner at LERA. He joined LERA in 1990.

John Ochsendorf '96, an associate professor in the Department of Architecture at Massachusetts Institute of Technology, won a 2008 MacArthur Foundation "genius" Award. He received the grant for his work on restoring structures from the distant past and identifying ancient technologies for use in contemporary construction. At Cornell, Ochsendorf majored in the college program. His primary area was structural engineering (former CEE professor Mary Sansalone was his advisor) and his secondary area was archaeology.

Donald W. White MS '85, PhD '88, an associate professor of structural engineering in the Georgia Institute of Technology's School of Civil and Environmental Engineering, is the recipient of the 2009 T. R. Higgins Lectureship Award given by the American Institute of Steel Construction.

Faculty

Wilkins Aquino is a recipient of the 2008 College of Engineering's Daniel M. Lazar '29 Excellence in Teaching Award.

Leslie Banks-Sills, adjunct professor in civil and environmental engineering and a professor of solid mechanics, materials, and systems at Tel Aviv University, has been elected as a fellow to the American Academy of Mechanics. In addition, she has been appointed Guest Professor in Solid Mechanics at Lund University.

Peter Diamessis is one of two CEE faculty members to receive the 2007–2008 College of Engineering, James M. and Marsha D. McCormick Award for Advising of First-Year Engineering Students.

James Gossett, along with former student **David L. Freedman PhD '90**, currently a faculty member at Clemson, received the 2008 Outstanding Publication Award from the Association of Environmental Engineering and Science Professors. The award is given annually "to recognize the authors of a landmark environmental engineering paper that has withstood the test of time and significantly influenced the practice of environmental engineering." Gossett and Freedman were honored for their 1989 *Applied and Environmental Microbiology* paper titled "Biological Reductive Dechlorination of Tetrachloroethylene and Trichloroethylene to Ethylene under Methanogenic Conditions." They were the first investigators to report the complete conversion of chlorinated ethenes to nontoxic ethylene, forming the basis for now widely used bioremediation technologies to address chlorinated solvents, a common class of groundwater pollutants.

Ken Hover has been awarded the prestigious office of vice president of the American Concrete Institute (ACI). He began a two-year term as a vice president at ACI's spring 2009 convention and will become ACI's new

president in 2011. Other CEE members who were ACI presidents include Professor and Dean S. C. Hollister, 1934; Professor Emeritus Dick White, 1997–98; and CEE alum David Darwin '67, MS '68, in 2007.

Hover has also been elected by ACI to receive the Arthur R. Anderson Award for his "advancement of concrete knowledge through research and publications on air entrainment, construction practices, and quality control; and exceptional contributions to improved standards for concrete construction and building codes."

In addition, Hover has been selected as the recipient of the American Concrete Pavement Association's ACPA 2008 Outstanding Educator Award.

The College of Engineering's Phoenix was dragon-proof.

Tony Ingraffea has received the Richard J. Almeida Award from Project High Jump. High Jump is an important outreach program designed to provide support and stimulus to middle school students in Chicago, helping them to prepare for success in some of the most challenging college preparatory high schools in the country.

Fred Kulhawy is the recipient of the 2008 G. Geoffrey Meyerhof Award given by the Canadian Geotechnical Society, in recognition of his outstanding contributions to deep and shallow foundation engineering.

Phil Liu has been selected to receive the Alexander von Humboldt Research Award, given to "outstanding scientists and scholars from all disciplines whose fundamental discoveries, new theories, or insights have had a significant impact on their own discipline and who are expected to continue producing cutting-edge achievements in the future." Liu is spending the 2009 spring semester at Technical University Braunschweig, Germany. Liu also is the recipient of the College of Engineering's "Class of 1912 Professor" endowed chair.

Bill Philpot was recently promoted from associate to full professor.

Ruth Richardson was recently promoted to associate professor with tenure. She is one of two CEE faculty members to receive the 2007–2008 College of Engineering, James M. and Marsha D. McCormick Award for Advising of First-Year Engineering Students.

Monroe Weber-Shirk is the recipient of the Academic Achievement Award in recognition of his extraordinary service and dedication to students in the College of Engineering.

Contact us with your news:
civil_env_eng@cornell.edu
607.255.3690
www.cee.cornell.edu

The dragon from the College of Architecture, Art, and Planning squared off against the College of Engineering's Phoenix on March 13, 2009, as part of the annual Dragon Day.

Cornell University
School of Civil and Environmental Engineering

CEE UPDATE, 220 Hollister Hall, Ithaca, NY 14853-3501

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Reunion 2009: June 4–7

Saturday, June 6

Alumni breakfast buffet: Plan to attend this year's CEE alumni breakfast—especially if it's your reunion year. The breakfast will be held from 7:30 to 9:30 a.m. in McManus Conference Center in Hollister Hall. All alumni(ae) and their families are invited.

Immediately following the breakfast two ceremonies will be held to unveil the recognition plaques created for the donors who contributed $5,000 or more to the CEE Laboratories Renovation Campaign. The first ceremony will be held in the Environmental Fluids Teaching Lab located in the basement of Hollister Hall, followed by a ceremony in the Bovay Lab Complex located in the basement of Thurston Hall.

Please let us know if you are planning to attend the breakfast and the unveiling ceremony by e-mailing us at civil_env_eng@cornell.edu or calling 607.255.3690.

Homecoming 2009: October 16–18

Saturday, October 17

Big Red vs. Fordham

CEE alumni at Reunion Breakfast 2004