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Polishing the E in CEE/Amr S. Elnashai
Golden/Tracy Lundin (BS 80, MS 82)
World at risk: Managing risk to society
  Rapid response grants enable fast post-disaster evaluations
  A better approach to making decisions about risk
  Wireless monitoring promises safer rail bridges
  Assessing internal earthquake damage
  Safer rail transport of hazardous materials
  Lower risk from waterborne pathogens
A passage to India/Sarah Hoyle-Katz, SRIS student
Concrete canoe nationals hosted at Illinois
Department news
Summit in Tanzania focuses on water, sanitation
Hanson makes gift to rail program
Topology optimization connects engineering, architecture
Black carbon significant cause of global warming
Augmented reality useful for construction and beyond
Old Masters: William H. Munse
Student awards
Alumni news
Khachaturian speaks at December commencement
Hall visits memorials on Honor Flight
In memoriam
Chicago alumni dinner
Alumni awards
Polishing the E in CEE

BY AMR S. ELNASHAI, PROFESSOR AND HEAD
WILLIAM J. AND ELAINE F. HALL ENDOWED PROFESSOR IN CIVIL AND ENVIRONMENTAL ENGINEERING

We have a new dean of engineering, and we look forward to the further strengthening of our college under his leadership. The continued excellence of CEE is underpinned by a prosperous and intellectually muscular College of Engineering, as it is indeed underpinned by the academic strength and vitality of a number of departments around campus, in our colleges of Liberal Arts and Sciences; Agricultural, Consumer and Environmental Sciences; Fine and Applied Arts; Business; Law; among others. The College of Engineering has made strides in the past few years and is poised to reverse the slow pressure on its ranking, with Georgia Tech and Carnegie Mellon competing for the 5th slot with us.

Having a new dean, the head of our largest department of Electrical and Computer Engineering (ECE), with a relatively new provost and ex-dean of engineering, also from the flagship ECE department, is a rare opportunity for strategic expansion and integration of the various components of the college into an interdisciplinary, forward-thinking academy. In the CEE magazine issue of summer 2010, I took the liberty of sending an open letter to our then-new president. Within a page of advice I wrote, “... holding the moral high ground is of crucial importance to establishing clear positions on behavioral and ethical issues, to supporting diversity and to enhancing equal opportunity and social justice.” And, “the lifestyle of the presidents of large universities can be perceived as being regal and hence attract criticism, especially at times of budget reductions and furloughs. We expect our presidents to be sensitive to the hardship that has been endured by many and to lead by example.”

I have no words of wisdom for our new dean. He is a highly qualified, experienced academic leader with a luminous record. Below, I share thoughts on the priorities that the college could pursue, from my vantage point at the helm of the number one-ranked civil and environmental engineering department in the nation (in both graduate and undergraduate programs, not tied with anyone!)

We all have a stake in the college, and CEE is no exception. Indeed, CEE’s current lead over its traditional competition can be assured only through a rising College of Engineering that operates with purpose and according to a deliberate, coupled academic-financial plan. We have a college that includes amazing talents and exceptional sub-units, such as the communications, advancement and finance groups. There are sub-units that are ripe for significant strengthening, such as the research and the graduate programs offices, and sub-units that have lost key people, such as the undergraduate programs office. First and foremost, the college needs a strategy that includes critical goals in education, research, technology and every one of them, we want to capitalize on the opportunities of casting the educational experience of our students onto the stage of societal challenges. Cross-department and cross-college curricular content offered by our College of Engineering and delivered through innovative pedagogical mechanisms would propel us forward toward the goal of producing the engineer of the 21st century, an engineer who has depth and breadth, who integrates and assimilates global engineering contexts and who innovates solutions for society’s critical problems.

Our research enterprise is vibrant. We also need to find creative solutions to the challenge of increasing the research expenditure per faculty, where our ranking is 17th, inconsistent with our overall ranking of the three-way tie at 5th place. I dare say that the new Applied Research Institute is a potential component of the solution, not the solution. The long-term path that is consistent with our landgrant, open and broad-based university is to couple our well-known bottom-up model with institutionally led research thrusts. Such an approach requires developing immediate and medium-term research thrusts at the nexus of:

a. society’s global challenges,
b. our existing and near-term re-
Cross-department and cross-college curricular content offered by our College of Engineering and delivered through innovative pedagogical mechanisms would propel us forward toward the goal of producing the engineer of the 21st century, an engineer who has depth and breadth, who integrates and assimilates global engineering contexts and who innovates solutions for society’s critical problems.

The governance of the college and its relationship with centers and departments is healthy and constantly improving. It is time we move in a more emphatic manner to identify, as a community, where the lines of authority and decision points are, shifting more toward the departments and centers, to liberate the college from its current lock on process, and to enable it to be more of the intellectual leader and less of the bean counter. Heads and directors should be trusted to run their units and to maintain excellence and solvency. There could be mechanisms put in place to assess metrics and outcomes, as opposed to interfering in every decision, little or large, and requiring a trail of approvals and signatures on business that is truly of a local nature and impact, funded from internal department/center sources.

We remain tentative in our relationship with the national laboratories and industry research as a whole, with a somewhat flat invention disclosures and patents record reported by the Office of Technology Management. Our technology transfer effort requires attention through college-led stimuli that complements individual initiatives. The Engineering at Illinois global portfolio has been misplaced somewhere and a search and rescue effort is sorely needed. We have had two spouts of activity over the past six years through the dean’s initiative. We drew a comprehensive strategy in 2008 that went unimplemented. As recently as last summer we rediscovered the importance of global outreach, formed a working group, identified two important, feasible and highly recommended initiatives, and then brushed them aside.

While recognizing that the most effective global outreach model is that which is embedded in our thinking, our fabric, the Illinois global portfolio truly requires concerted effort to grow in a sustainable form before being implanted in our education and research programs, where its long-range prosperity will be assured. We need to take our global program much more seriously than has been the case. We need to identify high-value targets that serve our purposes and get on with implementation.

The communications and advancement plan and enable us to achieve not only strategic growth but also sustainability of approvals and signatures on business that is truly of a local nature and impact, funded from internal department/center sources. I have also said and repeated to anyone who cared to listen that the heads and directors are well-informed, but they are not part of the decision-making process. They have to be. Garnering a diverse community has eluded the college for many years. Why do we expect a different outcome when we have been doing the same thing forever? The college approach of rewarding departments for diverse faculty hiring has zero effect on diversity. I argue that the pool of candidates is determined once we issue an advertisement for faculty positions, and there is nothing that anyone can do about hiring diverse faculty once the pool of candidates is defined. Unless we broaden our searches, we will continue to miss out on reaping the benefits of a rich, diverse and empowering environment that represents the nation we are part of.

The communications and advancement teams are truly of the highest caliber. The process of identifying their message and priorities requires serious engagement from the academic leadership to avoid the coincidental nature of our campaigns and the tendency to brand us based on the current status.

Underpinning all the above is financial health. We have done very well there, through mainly a massive increase in tuition revenue. We are investing in the right topics. There is however no relationship between expenditure and goals, because there are no formal goals in the first place. We need to derive a functional budget, which is a budget that represents our expenditure in the fundamental functions of the college, i.e. education, research, technology transfer, communications, advancement, global outreach, governance and community-building.

How else could we judge whether we are under- or over-investing? We need to redefine our budget projections over the next five to 10 years and work tirelessly on the sensitivity of these budget projections to internal, regional, national and international fiscal measures and metrics. I wonder whether I should start this section or close it with repeating, and emphasizing, the acute need for the college to have (a) a strategy that is drawn by the community, (b) identified goals that serve the strategy, and (c) a detailed implementation plan to achieve these goals.

I advocate engaging our faculty, student representatives, staff, alumni, friends and supporters in a conversation that leads to identifying two to three goals under each of the above fundamental functions of academic units. These goals would then form the core of our strategy implementation plan and enable us to achieve not only strategic growth but also sustainable development of our college toward global recognition as one of the most progressive and successful engineering academies of learning, discovery and engagement.

It is not very frequent in large research
Continued from page 5

universities in the U.S. to have departments that are higher ranked than the school they report to, and at the same time schools that are higher ranked than the campuses they report to. This is interestingly the case at Illinois, where Materials Science and Engineering, CEE and Agricultural Engineering are at or very near the top. My concern as a CEE professor, and for the time being as head, is that the sustainability of the current CEE top ranking is insufficiently secure without further strengthening of the College of Engineering and the campus. This is a challenge and an opportunity. By the College of Engineering reaching out to the other colleges on campus to create institutional partnerships, seeking new value propositions, nucleating interdisciplinary research and education pods, we not only strengthen the College of Engineering, but also underpin its excellence by enhancing the quality of the body to which it belongs, the University of Illinois at Urbana-Champaign. A new era of intellectual and practical cooperation in the Council of Deans is timely and will serve all constituencies well. The Council of Deans can and should be the campus leadership team, the intellectual powerhouse, and the turbo-engine of progress. There is no doubt that the cooperation between various disciplines and sub-disciplines on our campus is intense. This cooperation is by-and-large driven by individuals, which is great but acutely insufficient. A new organizational compact between our colleges, industry partners, national laboratories and influential alumni is required; the time for this compact is now.

CEE went through a successful experiment in its engineering subspace. The CEE experiment may be scalable to the college level. The seven pillars of CEE, the sub-disciplinary areas that form the department, are in many or most ways units representing departments. Through a community-based dialogue and guided debate, CEE emerged as an integrated academic unit that others are trying to emulate. Over the past four years, the CEE faculty size increased by 27 percent, with no single resignation in four years, and the undergraduate and graduate populations increased by 18 percent and 23 percent, respectively. Faculty diversity increased by 84 percent during the same four years through creative searching and hiring models. Income from advancement increased by 12 percent and research expenditure increased by 27 percent, and the best is yet to come as our 12 new professors ramp up their research programs. CEE is uniquely managed through coupled academic and budget plans, constituting an innovative business model for academic units. Our year-end committed funds, ready for investing in initiatives, have increased 80-fold in four years; in numbers, we now sustainably net more than $2 million per year. These funds are plowed back into the educational and research programs, and to effect even further enhancement of one of the best university infrastructures in the nation.

Our success is the success of the body we report to, the College of Engineering. We now look to the college and the new dean not only to recognize the singular accomplishments of CEE at Illinois but also to consider our successful experiment as a blueprint for the college’s future of engaging the academic departments and centers in developing a strategy, goals and an implementation plan in an interdisciplinary framework that steers our diverse academy forward and upward. I repeated the words “strategy” and “implementation” six times each in this article for a reason. Without a plan, the college may continue to be great, but we will not head toward being the greatest. The three levels of departments, colleges and the campus are totally symbiotic. Our ambition is not only to continue to lead our field of civil and environmental engineering nationally and internationally, but also to partake in elevating the campus, including the College of Engineering, to new heights of excellence and recognition.
Golden

BY TRACY K. LUNDIN, P.E., (BS 80, MS 82)

President, CEE Alumni Association Board of Directors

On March 15, 1963, the civil engineering department head, Professor Nathan Newmark, was notified that the petition to establish the Civil Engineering Alumni Association had been unanimously accepted by the University of Illinois Alumni Association. The Civil Engineering Alumni Association (later re-named the Civil and Environmental Engineering Alumni Association) was officially launched at an alumni luncheon held on May 25, 1963, in the Illini Union on the Urbana campus. One of the items on the agenda of that meeting was a discussion of the progress on a new building for Civil Engineering. In later years this building would be renamed to honor Professor Newmark.

This year marks the golden anniversary of the Civil and Environmental Engineering Alumni Association (CEEAA). A special 50th anniversary celebration of the CEEAA will be held on the Urbana campus Sept. 6-7 to honor past and present CEE board members and department heads. An alumni reception will be held in the new Yeh Student Center in Newmark Lab on Friday, Sept. 6, beginning at 6 p.m. It’s fitting that this celebration will be held in the new Yeh center, which was funded entirely by private donations, including a major donation by M.T. Geoffrey Yeh (BS 53).

All are invited to attend the reception and to stay on through Saturday for a football game versus Cincinnati, complete with a CEE pre-game tailgate event. For more details, including lodging options, please check out the CEE events web page (cee.illinois.edu/events).

The mission of the University of Illinois CEEAA is to support the department faculty, staff, students and alumni, and to inspire lifelong loyalty and pride among alumni and friends by developing and enhancing their continued relationship with the department. To fulfill its mission, the association established a Board of Directors to provide advice and counsel to the department. The board also recognizes distinguished alumni, fosters collegial alumni relations and alumni support of the department, mentors students and facilitates their entry into the profession, represents the department’s activities conducted by the Alumni Association, and supports the department’s public outreach activities. Check out who we are, what we do, and how you can join us at cee.illinois.edu/alumni.

For much of the time that the CEEAA has been in existence, the department has been rated as having the top or near the top civil engineering undergraduate AND graduate programs in the United States. Currently, CEE at Illinois is alone in the top spot in both categories, not tied with any other school. I maintain that the department, your department, sets the gold standard for competing programs across the globe. If you have any doubt about CEE being the gold standard, check out “Leadership and Legacy — A history of Civil and Environmental Engineering at Illinois,” edited by William J. Hall and Amr S. Elnashai, and published by the Department of Civil and Environmental Engineering. This book chronicles the evolution of the department and includes a who’s who of some of the giants in our industry, many of whom taught classes that you may have attended. (Contact Breanne Ertmer, ertmer@illinois.edu, to obtain a copy.)

In the last president’s address, I asked you to consider joining the CEEAA and supporting our mission by participating in events, volunteering your time or providing financial support to the department in recognition of the significant benefit granted to every University of Illinois civil engineering graduate due to the outstanding reputation of the department and the quality of its alumni. The weekend of September 6 is a chance for you to get involved and to rekindle relationships, perhaps including your relationship with your department.

So, please come join us and visit the new Yeh Student Center on the golden anniversary of the department that sets the gold standard — CEE at Illinois.

Are you interested in serving on the CEE Alumni Association Board of Directors?

Application available online at cee.illinois.edu/alumni. For more information, contact Breanne Ertmer, ertmer@illinois.edu, (217) 265-5426.
Natural and malicious disasters around the world have persistently revealed the lack of a holistic approach toward the four components of disaster management: assessment, mitigation, response and recovery. Civil and environmental engineers are uniquely suited to integrate the physical, natural and social sciences to help society better understand and manage risk. The rapidly evolving, intricately complex and increasingly critical topic of Societal Risk Management is a research thrust area for CEE at Illinois and the focus of a new academic program that offers M.S. and Ph.D. degrees, as well as new areas of concentration for undergraduates.

As the department welcomes its first Societal Risk Management (SRM) students this fall, it might surprise some to learn that critical foundational work for this cross-cutting academic program is being led by not only a civil engineer, but also a philosopher and a lawyer.

CEE Associate Professor Paolo Gardoni, who co-directs the SRM program with Associate Professor John Popovics, has teamed up with longtime collaborator Colleen Murphy, an associate professor in the University of Illinois Department of Philosophy, and associate professor Arden Rowell of the university’s College of Law. Their goal: to pioneer a deeper understanding of the interdisciplinary issues of risk management related to ethics, justice and policy. Their work will lay

Continued on page 10
Continued from page 9

the groundwork for the evolution of the SRM program and the research thrust area that dovetails with it.

“Risk is not something an engineer alone can define or work on,” Gardoni said. “Even though within the past decades there has been a lot of progress in estimating probabilities of failure and probabilities of occurrence from the engineering side, we are now coming to realize that there is much more to risk.”

Each year, natural disasters around the world such as earthquakes, hurricanes, tornadoes and floods kill approximately 80,000 people, render millions homeless and result in economic losses of $50 billion-$60 billion, according to a World Bank and United Nations joint report. But the effects of disaster go beyond lives lost and property damaged to numerous other concerns, such as ripple effects on interconnected infrastructure systems and social upheaval. Growing awareness within civil engineering about the complexity of the effects of disasters has led to an increasingly multi-disciplinary approach to understanding them and managing societal risk, Gardoni said.

The SRM program, one of three new cross-disciplinary programs introduced within the past two years in CEE at Illinois, focuses on risk determination, risk evaluation and risk management for natural and human-made hazards, and disaster response and recovery. It offers M.S. and Ph.D. degrees, as well as additional concentration areas for undergraduates. The goal is to develop a new generation of civil engineer with both the technical expertise to develop sustainable solutions to the world’s most pressing challenges and a deep understanding of the social and ethical dimensions and implications of their work.

The team’s plans include organizing a workshop at the University of Illinois on the Societal Risk Management of Natural Hazards in spring 2014 which will bring together leaders in the area of risk management from engineering, philosophy and law. The organizers hope the workshop will foster a deeper and more complete understanding of the ways societal risk management policy and ethics influence and are influenced by engineering. Each presenter will be invited to contribute to an edited volume on the general theme of Societal Risk Management, which the team hopes will serve as a foundational book for continued conversations across the disciplines.

“The idea is to bring in the most prominent scholars in the field who can help shape and contribute to this area,” Gardoni said. “The goal is to develop new ideas, make ideas grow and also start collaboration with some of the key players for future proposals and research.”

More broadly, the team is working to help make the University of Illinois a national and international leader in this emerging area of research and education.

“This work will have far-reaching impact, contributing to the international engineering and scientific community, the integration of research and education, and the safety of society by educating engineers to have a global mindset and to be aware of ethical, legal and policy standards appropriate for a global world.”

Gardoni and Murphy have built a significant body of work in the area of risk management, enhancing the engineer’s traditional, primarily technical approach toward quantifying and mitigating damage from natural disasters with the philosopher’s perspective on the moral dimensions of risk. The addition of Rowell brings in a focus on policy and regulating human behavior.

“Risk management is, at its heart, about finding a way to pull together technical, philosophical and regulatory expertise,” Rowell said. “It requires deep technical understanding of what risks are and what creates them, and thoughtful philosophical reflection on which risks we should care about and why. Finally, it demands a legal and policy-based analysis that inquires into the role of human behavior in managing and reducing targeted risks. What policies regarding risk should we adopt as a society, as individuals, as groups? What should those policies look like? How should they be shaped so that we achieve the best possible risk management strategy? Answering these questions requires more expertise than any one person can have or their own.”

Collaborating across disciplines can be challenging, Murphy said.

“Communication is hard, because the methodology is different, the questions that are asked are different, the interest is different, the way of writing is different,” she said. “This makes it challenging but also extremely interesting, because you realize how relative your own perspective is, even in thinking about the same problem.”

This challenge and the innovative thinking it sparks go to the heart of what CEE’s new cross-disciplinary programs are all about, Gardoni said. As the oldest engineering discipline, civil engineering has continually reinvented itself, finding renewed relevance as society evolves, he said.

“Now we have the opportunity to be at the center of a revolutionary change in the way we think about natural hazards, how we tackle hazards, and how we mitigate and recover,” he said. “Civil engineering can be at the center of that, but at the same time we cannot do it alone anymore. We need to realize that we need to leverage expertise from outside.”

Photos top to bottom: Colleen Murphy, Arden Rowell, Paolo Gardoni.
Rapid response grants enable quick disaster response, high-impact research

In May, a tornado struck the Oklahoma City suburb of Moore, leaving a swath of devastation a mile wide and 17 miles long. Three days later, a bridge collapsed in Mount Vernon, Wash., sending two cars into the Skagit River below. Within days, CEE researchers were on site at both locations, surveying the damage and gathering perishable information about the effects of the disasters. Funded by CEE Rapid Response Grants, they hoped to learn something about the infrastructure failures that could guide future research and improve public safety.

A fast response is essential after disasters, because recovery and cleanup efforts can destroy or obscure evidence that is important for forensic engineering. The new CEE Rapid Response Grants were established to support high-impact research related to infrastructure improvement and societal risk management in the wake of disasters.

Tornado recon in Moore

Associate Professor James LaFave and Assistant Professor Larry Fahnestock visited Moore June 7-9, studying damage from the E5 tornado on May 20. They examined residential, public and commercial buildings to see what lessons could be learned about the engineering of structures, construction practices and disaster preparedness.

They viewed homes, schools, hospitals, businesses and other structures, with a particular focus on low-rise structures common in the Midwest. The information they gathered will form the basis for continued research with the goal of better understanding, analyzing and designing for strong wind and debris, or “wind-borne missile,” effects on structures.

Bridge collapse investigation

The bridge that collapsed May 23 along I-5 in Mount Vernon had previously been declared in “fair” condition and “functionally obsolete” by transportation officials. When a truck’s oversized load struck the bridge, a 160-foot section of it gave way. The accident highlights the nation’s aging infrastructure and lack of significant improvements in the six years since the Minneapolis bridge collapse that killed 13, according to Professor Timothy D. Stark, a member of the geotechnical engineering faculty, who is leading a multi-disciplinary team of CEE researchers investigating the collapse.

Stark visited the site June 12 with Associate Professor James M. LaFave, structural engineering. Others involved include Professor Marcelo H. García, hydrology; and Professor Rahim Benekohal, transportation. The group is looking at what role, if any, the condition of the bridge played in its collapse, whether damage to the bridge piers from the river water contributed to its collapse, the appropriateness of its signage, and responsibility of transportation entities when bridges are known to have condition problems. The perishable information the team gathers on the site visit will facilitate further research with the goal of increasing public safety.

New program: Societal Risk Management

Throughout the world each year, natural disasters kill approximately 80,000 people, render millions homeless and result in economic losses of $50 billion-$60 billion, according to a World Bank and United Nations joint report. Mitigation pays back at a ratio of more than 1:5; for every dollar spent, more than $5 are saved, not including measures of human suffering (World Bank, 2008).

The Societal Risk Management (SRM) program is a cross-disciplinary program that focuses on the development of a secure and safe society. The program concentrates on risk determination, risk evaluation and risk management for natural and human-made hazards, and disaster response and recovery.

Graduates are prepared to work in a variety of positions from traditional CEE design firms to insurance companies, management consulting firms, government agencies and academic institutions. Students interested in this program also have the option of joint degree programs with Architecture, Business Administration or Statistics.
A better approach to decision-making about risk

The effects of natural disasters on society can be devastating, affecting people and infrastructure in often irreparable ways. Engineers perform risk analysis to better understand the risks in an attempt to mitigate the damage. But traditional approaches to risk analysis offer an incomplete picture, and decision-makers need a better framework for evaluating risk. So say associate professors Paolo Gardoni of CEE and Colleen Murphy of U of I’s Department of Philosophy.

For nearly a decade, the two have tackled the concept of risk, integrating technical and ethical points of view for a broader perspective on the critical considerations. Now they are nearing the end of a four-year project, funded by the National Science Foundation (NSF), for which they have developed a comprehensive taxonomy of acceptable and tolerable risk. The work promises to be both a helpful navigation guide for decision-makers and an important intellectual contribution to the growing field of risk analysis.

“Any decision-maker will be able to use the outcomes we produce,” Gardoni says. “This work has the potential for making a transformative change in the way decisions are made at any level and can have a very significant impact on policy-making, legal aspects and myriad engineering aspects.”

In grappling with the issue of societal risk from disasters, engineers have traditionally used methods of risk analysis that adequately quantify expected physical damage, but that perspective offers only part of the picture, Gardoni and Murphy say. Factors that those numbers don’t effectively address include a disaster’s effect on individual well-being, as well as the ethical issues surrounding risk. Examples of the ethical dimensions of risk include choosing what to consider when measuring the severity of the consequence of the risk, whether a risk is voluntarily assumed, whether negligence or intentional wrongdoing is involved in the creation of a risk, and whether who stands to gain from taking a risk is different from who stands to lose, Murphy says. Gardoni and Murphy argue that decision makers should take into account moral evaluations of the creation, design and modification of the built and natural environments, which are the source of the risks associated with natural disasters. The risk to individuals should be expressed in terms of a disaster’s effect on their “capabilities,” or the “real, actual possibilities open to a person, capturing what an individual realistically can do or become,” they write. This is an extension to risk analysis of concepts proposed by Nobel Prize winner Amartya Sen in the context of development economics and currently adopted by the United Nations to gauge the well-being of countries around the world.

Another important concept in Gardoni and Murphy’s work is the distinction between acceptable and tolerable risks. Acceptable risks are in principle morally satisfactory and do not require mitigation. Tolerable risks are greater than acceptable risks but do not exceed a specified level and are permissible when in practice it is not possible to make the level of risks acceptable. The determination of whether a risk is acceptable or tolerable depends in part on a comparison between the overall level of capabilities in the aftermath of a hazard and pre-determined thresholds of acceptable and tolerable levels of capabilities.

In developing their taxonomy, Gardoni and Murphy have incorporated diverse perspectives on risk from experts in a range of fields, including law, social science, philosophy and engineering.

“One immediate contribution is creating a novel, comprehensive framework that draws from a whole range of discussions that are going on among people who aren’t even aware of one another, or that they are talking about the same thing, or that the concerns they have are actually complementary in some ways,” Murphy says.

Wireless monitoring promises safer railroad bridges

By Leslie Sweet Myrick

As interest gains in implementing high-speed rail in North America, CEE researchers are developing innovative ways to monitor existing railroad infrastructure to ensure safety for this new traffic.

In a new project for the Federal Railroad Administration led by Professor Bill Spencer, two CEE research centers, the Smart Structures Technology Laboratory (SSTL) and the Rail Transportation and Engineering Center (RailTEC) are working together to develop a portable, cost-effective and practical wireless structural health monitoring system for railroad bridges in North America. Currently, the monitoring options for freight tracks are wire-based, expensive and difficult to deploy.

“The new system is intended for periodic deployment rather than as a permanent installation, so it can be moved from bridge to bridge to maximize its usefulness,” Spencer said. “The wireless smart sensors will provide railroads with up-to-date information about the in-service performance of their bridges. For example, excessive motion of the bridge deck can show a decrease of bridge performance, increasing passenger discomfort and, if ignored, potential car derailment. The goal of the monitoring is to enable...
The wireless smart sensors will provide railroads with up-to-date information about the in-service performance of their bridges. ... The goal of the monitoring is to enable early detection so that corrective action can be taken.

early detection so that corrective action can be taken. As a result, railroads can increase reliability, reduce maintenance costs and better prioritize repairs.”

The monitoring project is in conjunction with CN railroad, which has identified a bridge in south Chicago for instrumentation and testing. After developing an analytical model for this specific bridge, the team plans to install at least 10 wireless nodes on the actual bridge to measure train loads, train speeds and bridge response. The field monitoring will then be compared to the analytical models. Over time, the analytical models will be verified and calibrated so that they can become predictive tools for the railroad.

“As a result of this new monitoring system, the bridges will be safer for all rail traffic and easier to maintain,” Spencer said.

Spencer and his team from the SSTL have extensive experience working with wireless sensors in Illinois and as far away as Korea. His team accomplished the largest-ever deployment of a wireless smart monitoring system on the Jindo

Continued on page 14
Assessing internal earthquake damage

BY LEANNE LUCAS

After an earthquake, it can be difficult to determine how much internal damage a concrete structure has sustained. Is a building safe to occupy? Can a bridge be put back in service? Thanks to work by a CEE research team, engineers may soon have a tool that will enable quick, accurate non-destructive testing of concrete components for more effective, efficient disaster response.

“My vision is to have a tool we can give to an engineer for post-event risk mitigation,” said Associate Professor John Popovics. “He or she has to know if a freeway bridge can be open for traffic after a seismic event. They take the tool, run the scan and make an accurate engineering judgment about the stability of the structure. This column is fine; this one’s not. How valuable is that?”

Popovics, who is co-director of CEE’s Societal Risk Management Program, is part of a large, multi-university research project funded by the Network for Earthquake Engineering Simulation (NEES) of the National Science Foundation. Total funding for the project is $1.3 million for three years. Popovics is working with colleagues from the University of Texas-Arlington (the lead on the project), California State University-Chico, and the University of Minnesota. All testing for the project is being done at the Multi-Axial Subassemblage Testing (MAST) Laboratory in Minnesota.

One aspect of this research is looking at collapse protocol to better understand how buildings collapse under severe loading. Popovics’ team has the task of assessing internal damage in the concrete columns during loading.

“There is significant technology that can assess what’s happening to structures on the outside,” said Popovics, “but there’s no real technology to assess what’s happening on the inside. For some structures, visual assessment is enough, but it’s very difficult to identify the extent of internal cracking in large concrete structures, especially if they have any sort of exterior wrap. And this assessment becomes crucial when you’re talking about a bridge that has to be evaluated quickly and accurately after a seismic event.”

The technology Popovics’ team is developing would have many applications in civil infrastructure and could be used to do any large structural assessment where there is limited access.

“It’s realistic to think that in five years, if we continue to make improvements, we should have a technology that we can sell to a developer to manufacture,” he said.

The researchers are using ultrasonic tomographic imaging to assess internal damage.

“The process is similar to another common form of tomography, the CAT scan, which uses a series of x-rays to obtain an image,” Popovics said. “But you can’t use x-rays on full-scale concrete columns. The amount of energy you would need to get through concrete wouldn’t be safe or practical. So we’re using ultrasonic tomography.”

Popovics said it was a challenge to find a way to collect enough information to build an accurate model.

“The hard part is getting enough energy into the concrete to get measurable results,” he said. “You can’t take just one signal; you have to take a thousand signals. That means you almost have to have...

Continued from page 13

Bridge in South Korea in 2009. This latest project is being conducted in close cooperation with the railroad industry, the Federal Railroad Administration and CEE’s own RailTEC. The wireless sensor system should be ready by 2014.

In a related project, Spencer is developing a monitoring system for railroad bridge impacts by under-crossing large trucks and barges.

“The ultimate goal of this research is to produce a sensing strategy that can inform railroads about an impact event in real-time, enhancing the safety of railroad operations,” Spencer said. “Although such impacts can inflict immediate damage, if they go unnoticed by the railroad and are not reported by ‘hit-and-run’ offenders, they can also cause hidden damage that leads to gradual degradation of the structure.”

No such system has previously been designed for railroad bridges. The new monitoring system will sense and immediately report the impact, thus promoting prompt inspection of the bridge structure and addressing of potential dangers.

The final deliverable set for late 2014 will include a user-friendly interface to help railroad staff interpret the reports.

“We plan to explore the possibility of incorporating a camera which is woken up whenever an impact is sensed to capture images of the offending vehicle,” Spencer said.
a fast-moving scan. The traditional method has been to attach your sensor to the specimen, take a measurement, move the sensor, take another measurement, move it. To take a thousand measurements would take a day.”

So Popovics and his team built a motorized scanning frame to implement air-coupled ultrasonic tomography.

“We mounted sensors on a frame that sits next to the concrete column. The frame automatically scans across the column, holding the sensors and collecting data.

“I knew it would be unrealistic to expect immediately functioning protocol and equipment since we built our own design from zero,” he said. “So we built two ‘fake’ columns here that simulated the geometry of a real column, and we used those to refine our equipment. I didn’t want to take our equipment to MAST and waste everyone’s time if something didn’t work.”

Popovics said a second challenge has been interpreting the data.

“We need to reconstruct what’s happening on the inside with a sensitivity that can find where cracks are propagating, and where they are not,” he said. “That’s the challenge. It’s very difficult.”

There are seven full-scale columns at the MAST laboratory, and Popovics’ team was able to test three of the seven in the first phase of their research.

“We have a very good robust system now, and we’re ready to go for all of the columns in phase two,” he said.

New cross-disciplinary programs fully launched

The Societal Risk Management program is one of three new cross-disciplinary programs within CEE at Illinois, which as of fall 2013 will be fully launched in the department. The programs are designed to integrate the traditional CEE sub-disciplines and give undergraduate and graduate students a broad, systems perspective on the world’s complex civil and environmental engineering problems. The other two programs are Sustainable and Resilient Infrastructure Systems and Energy-Water-Environment Sustainability.

For undergraduates, the new programs offer additional choices for primary or secondary concentrations, along with the traditional CEE areas of study — construction management, construction materials engineering, environmental engineering, environmental hydrology and hydraulic engineering, geotechnical engineering, structural engineering and transportation engineering.

The programs also offer M.S. and Ph.D. degrees and opportunities for international trips as part of a “Global Leaders in CEE” component, which brings together both undergraduate and graduate students. The programs also offer seminar series that bring experts to campus.

“The students are voting with their feet in support of the cross-cutting programs; the number of students, their grades and their enthusiasm is further proof of the timeliness of expanding our curricula and educational experience in general,” said Amr Elnashai, Professor and Head. “Other leading departments are following suit.”
Safer rail transport of hazardous materials

By Leslie Sweet Myrick

Transportation and structural engineering researchers are teaming up to develop an analytical method to measure the safety performance of railroad tank cars. Their techniques will be used to establish new industry standards to ultimately reduce the risk of transporting hazardous materials (hazmat) by rail.

“Although 99.998 percent of rail hazmat shipments reach their destination without a release caused by a train accident, potential tank car releases from train accidents could lead to severe consequences, especially if they happen in highly populated areas,” said M. Rapik Saat (BS 03, MS 05, PHD 09), a research assistant professor in the Rail Transportation and Engineering Center (RailTEC).

Saat and his colleague Christopher P.L. Barkan, professor and executive director of RailTEC, are working with Junho Song and Paolo Gardoni, both associate professors in structural engineering, to understand how new tank car designs will perform in accidents.

“A series of catastrophic tank car accidents in the 1960s and early 1970s led to several new safety features and the compilation of databases of information to measure and predict the safety of cars in service,” Barkan said. “As these databases were expanded and refined, it became possible to assess which combinations of changes in tank car safety design were most likely to maximize safety benefits. As part of a project we are finishing up during summer 2013, we updated a statistical model to evaluate existing tank car designs, the ongoing interdisciplinary collaboration between CEE’s railroad and structural engineering groups will pave the way for development of an analytical model to bridge statistical and analytical modeling (i.e. finite element analysis) approaches. For example, the interdisciplinary approach adds the ability to assess potential benefits of using new steel materials and/or structural configurations.

Tank car safety design optimization needs to consider the tradeoff between safety and efficiency, Saat said.

“For example, if you increase a tank car’s thickness, you may make it safer, but you decrease its capacity, and therefore may need more tank cars to carry the same amount of material. Our goal is to help industry find the optimal designs,” he said.

The development of this new analytical model is driven by industry and will be used for policy making.

“For example, with a new tank car design, they will do physical testing and finite element modeling to come up with the puncture energy and then translate the puncture energy to determine potential rate of release with a certain level of uncertainty,” Saat said. “This will advance the industry’s risk-based decision making to ultimately reduce the risk of transporting hazmat by rail.”

The work is a collaborative effort between government agencies and private industries involved in hazmat transportation in North America and is sponsored by the Association of American Railroads, Railway Supply Institute, American Chemistry Council, Chlorine Institute and Fertilizer Institute. CEE graduate students Laura Ghosh and Xiaonan Zhou have contributed to the project as well as Stephen Kirkpatrick from Applied Research Associates and Todd Treichel of the RSI-AAR Railroad Tank Car Safety Research and Test Project. At least one structural engineering student will also join the project team this fall.

The first phase of the new analytical model is expected to be completed in 2014.

Top photo: A tank car built by Trinity Industries to the new standards with thicker shell and head and lower-profile protective housing. Risk and optimization models from CEE researcher Rapik Saat’s Ph.D. dissertation research were used to identify potential enhanced tank car designs to transport toxic inhalation hazard materials. These were later used by the U.S. Department of Transportation to develop hazardous materials tank car regulations in 2009. Above, top to bottom: Professor Chris Barkan, Associate Professor Junho Song, Associate Professor Paolo Gardoni, Research Assistant Professor M. Rapik Saat.
Lower risk from waterborne pathogens

Our society often takes for granted the quality of our water and the security of our public water infrastructure. Then we learn that a waterborne pathogen in a drinking water distribution system has triggered an outbreak of disease (the most familiar being Legionnaires’ disease) and we are reminded of our vulnerability.

Associate professor Helen Nguyen and Professor Wen-Tso Liu are working with colleagues in Illinois, Minnesota and Switzerland to find ways to decrease that vulnerability. They are developing significant scientific data that will accurately assess public health risks related to waterborne pathogens, and enable new approaches to minimize those risks.

Nguyen and Liu, along with Raymond Hozalski, professor at the University of Minnesota, received a $600,000 grant from the Environmental Protection Agency (EPA) to study the association of pathogens with biofilms in drinking water distribution systems (DWDS). Nicholas Ashbolt of the Office of Research and Development at the EPA is adviser to the project. The team is studying Legionella pneumophila, the pathogen responsible for Legionnaires’ disease.

In layman’s terms, a biofilm is any group of microorganisms in which cells stick to each other on a surface. Biofilms on the pipe walls of a DWDS can attract and harbor the pathogen found in the DWDS linked to outbreaks of Legionnaires’ disease.

There are two objectives to this project; the first is to determine what mechanisms selected pathogens use to adhere to biofilms attached to pipe walls. The second objective is to determine the conditions that lead to detachment of biofilm from the pipe walls.

“One variable that we are testing is the piping/coating materials,” said Nguyen. “Do the physical, chemical and microbial characteristics of the indigenous biofilms grown inside DWDS depend on the surface chemistry and roughness of the piping material?”

Water chemistry composition is another variable, said Liu.

“Does the water chemistry, such as ionic strength and hardness, influence the number of bacteria that attach to the biofilm?” he said. “In addition, we are looking at whether the microbial community in the biofilm influences the attachment of bacteria onto the biofilm.”

Disinfectant types (for example, chlorine vs. chloramines) will also be tested. Because the biofilm matrix can prevent disinfectants from reaching cells located deep inside the biofilm, the researchers are testing changes in biofilm strength and detachment resulting from disinfectants and biofilm disruptor treatments.

Nguyen said the study is very time-consuming, because graduate students must grow the biofilm they analyze, and that can take a month or more. A specimen is then sent to the Biophotonics Imaging Laboratory at the Beckman Institute for Advanced Science and Technology. The team is working with Stephen Boppart, a professor in Electrical and Computer Engineering and head of the laboratory. Boppart uses optical coherence tomography (OCT) to determine the biofilm thickness and roughness. OCT has the ability to image deeper in thicker biofilms and over larger areas and volumes.

From there, the imaging data is sent to Eberhard Morgenroth, a former faculty member in CEE at Illinois, now a professor at Eawag, the Swiss Federal Institute of Aquatic Science and Technology in Switzerland. After the data is processed and quantified, it is sent back to Illinois for further analysis.

Nguyen and Liu believe that successful completion of the project will provide the scientific data necessary to allow sound selection of pipe and coating material for future construction of DWDS infrastructure. It will also develop new approaches for cleaning DWDS based on the strategy of weakening the biofilm matrix and enhancing biomass detachment.

“The ability to control biofilm and pathogen proliferation in DWDS will go a long way to minimize the adverse effects on public health,” Nguyen said.

Photos: Associate Professor Thanh Helen Nguyen and Wen-Tso Liu.
As we stepped out into the warm night of January 4, surrounded by the irregular melody of car horns and hundreds of people calling out to friends, flowers adorning the many plants and vehicles around us, it became clear that we were no longer in Urbana-Champaign.

Our group — two CEE professors and 13 students — had just arrived in Chennai, India, as part of the first Global Leaders trip in the department’s Sustainable and Resilient Infrastructure Systems (SRIS) program. We students — a mixture of graduate and undergraduate students from SRIS, Construction Management, and Environmental Engineering — had come to Chennai to begin work on urban sustainability projects and perhaps gain some global perspective and real-world experience on the side.

Our first visits were to cultural sites. DakshinaChitra, a cultural center for South Indian traditional arts, was a festival of colors, sights and sounds. We watched a glassblower sculpt a miniature elephant, experienced the humming drums and stepwork of a thunder dance, and had a lunch of diversely and deliciously spiced dishes. Our next stop was Mahabalipuram, a UNESCO World Heritage site not far from Chennai. We walked through temples hundreds of years old, carved out of solid rock into an intricate mosaic of human and animal forms. As we walked through the Shore temple, gazing into stone faces worn smooth and expressionless by centuries of salt air off the Bay of Bengal, it struck me how long people had lived in this place, working to maintain order in the face of inevitable and often chaotic nature. Nowadays, I reflected, the challenges might not be all that different.

Our professional site visits began with a tour of rainwater harvesting sites given by the director of the Chennai Rain Center. Chennai, we learned, has the dual problems of potable water shortages and seasonal monsoons: enough water to flood the streets at some times, at other times so little that the groundwater table drops. By collecting, filtering and infiltrating rainwater on-site, problems of water shortages and flooding...
can be avoided. The idea is catching on — we even saw a rainwater infiltration well on the grounds of the San Thome Basilica.

The next day we sat in the offices of the Chennai Metro Rail, drinking sweet coffee with milk, a South Indian specialty. Putting in an urban rail network where one did not exist before is no small feat in any area, but Chennai poses some unique challenges. The area has been densely built up for more than a thousand years, resulting in narrow right-of-ways and little available space for the infrastructure needed to support a city-wide rail system. The scale of the challenge became apparent as we stood on top of one of the constructed rail lines, looking out across a patchwork of buildings of all heights and styles, interwoven with bands of river, road and greenspace.

We visited more projects involving water on the following days. The wastewater treatment plant we visited was the largest I had ever seen and still expanding. As we walked by the pools affiliated with different parts of the treatment process, we learned that the plant meets most of its own energy needs throughout the year through gas production, made possible by the constant subtropical warmth. Finding a cost-effective solution to the infrastructure corrosion caused by hydrogen sulfide gas was high on the plant’s list of priorities.

The patchwork of the Pallikaranai marshland reflected its historical classification as a “wasteland”; the marsh, an important migratory bird nesting site, was bisected by a major roadway and massive open dump, and surrounded by encroaching IT buildings. In part due to a grassroots campaign, the marshland is now protected from further encroachment, and restoration work has begun.

Our final visit was to the Indian Institute of Technology Madras (IITM) Intelligent Transportation Systems laboratory. On many computer monitors before us were live videos of vehicles zipping or crawling across many Chennai roads, each vehicle enclosed in a virtual box as the lab’s programs remotely sensed and tracked them. We learned about the challenges and promises of remote sensing in Chennai, and how information on traffic conditions would help improve the at times remarkable congestion of the streets.

Then it was time to work: we sat in the offices of our faculty hosts at IITM, reading relevant papers and books, typing project outlines and discussing how concepts of sustainability and resilience could be integrated into the projects. After another day of work, we completed our project definitions and presented them to our fellow students, our professors and the IITM faculty as monkeys climbed outside the windows. After nine days, our stay in Chennai was over, but our work was just begun — we would spend the following semester fleshing out our ideas and completing the projects.

However, the trip was not all work. Every day was an experience of something new; we ate at all sorts of different restaurants, sampling everything from spiced curries to cool yogurt lassis to Indian pizza (expect peas, not pepperoni). Since we were on campus during Saraang, the university’s annual cultural festival, we attended a traditional music concert and the annual dance competition. Watching the teams dance both more traditional forms and hip-hop to “Gangnam Style” underscored for me what a globally connected and yet locally diverse world we live in.

What I left India with — aside from a project, photos, memories and a sari — was a renewed sense of scale. I saw the length of time over which we have grappled with how to make the world comfortable, beautiful and habitable stretching all the way from Mahabalipuram to the tapestried landscape of modern Chennai as viewed from the top of a rail line. Visiting Chennai gave me perspective not simply on the number and diversity of the people on our planet, but also how many of our concerns — safe water to drink, traffic jams on our way to work, pollution in our natural landscapes — are shared.
Concrete canoe teams from across the U.S. and as far away as Puerto Rico and Montréal gathered in Urbana-Champaign June 20-22 for the 2013 National Concrete Canoe Competition. The University of Illinois at Urbana-Champaign’s own Bone-yard Yacht Club was among the 23 teams competing. It was the first time the University of Illinois had hosted the national competition.

The competition began with the teams displaying their canoes on Bardeen Quad on Thursday, June 20. The next day, they made their oral presentations in the auditorium at Siebel Center, and Saturday was race day at nearby Homer Lake. The teams completed the men’s and women’s Slalom/Endurance races in the morning, but afternoon races were cancelled when a storm system moved in around lunchtime. The awards banquet was held Saturday night at the Colonnades Club in Memorial Stadium.

A five-member panel of judges from industry and academia evaluated the teams on the basis of design papers, oral presentations, their final products and their performance in the races. Prizes include trophies, plaques and a total of $9,000 in academic scholarships awarded to the top three schools.

The schools finishing in the top five overall in the 2013 competition were École de technologie supérieure of Montréal, Québec; the University of Nevada, Reno; the University of Florida; California Polytechnic State University, San Luis Obispo; and Utah State University. The Illinois team finished 22nd overall, but team members said they considered it an honor just to compete at the national level.

“A shiny trophy would have been nice,” said Hong Kim, team co-captain, “However, the team believes that it was a privilege to participate among the best teams in the nation.”

“The purpose isn’t about winning,” said co-captain Min Yin. “It’s about the learning process and meeting the challenges. We really appreciated this chance to participate, and hopefully we can do a better job next year.”

“It’s a huge deal for us [to host nationals],” said team member Arielle Matlinowski (BS 13). “We’ve been dying to go to nationals every year. I mean, five years ago, our canoe disintegrated in the water at regionals. Basically, we’ve been working our way up.”

Concrete canoe racing began at the University of Illinois in the 1970s, when civil engineering Professor Clyde Kesler gave his students the assignment to build a concrete canoe. When students at Purdue University heard about it, they made their own concrete canoe and challenged Illinois to a race. In 1971, the first intercollegiate concrete canoe races were held between Illinois and Purdue at Kickapoo State Park in Oakwood, Ill. The Illinois team won three out of five races and declared themselves world champions, even printing up t-shirts to mark the occasion.

A highlight of the awards banquet was an address by Kesler’s son, David Kesler, who said his father joined the faculty at Illinois after serving as an engineer under Continued on page 22.
Above, David Lange, faculty adviser for the ASCE student chapter, addresses the crowd on display day. At right, Illinois canoe team member Raphael Stern (BS 13) fills the canoe with water during the swamp test.

Above, canoe team members weigh in the Illinois canoe, which weighs just over 185 pounds. Below, California Polytechnic State University, San Luis Obispo, reigning champions for the past three years, placed fourth this year with “Yosemite.” Top photo: The Illinois canoe’s name, “Vincere,” means “to conquer.”
Steel bridge team places fourth at regionals

This year, in spite of much more challenging rules regarding allowable connections, the Steel Bridge team had an impressive showing at the regional competition at Trine University in northeast Indiana. Through a more comprehensive design process and very careful fabrication, the bridge weight was reduced by 55 percent, while the stiffness increased by about one-third compared to last year’s bridge. While the competition was much tougher than it has been in years past, our team placed comfortably fourth out of 16, just missing out on an invitation to the national competition. The team is looking forward to improving even more next year, when the Great Lakes regional competition will be hosted by the University of Illinois at Urbana-Champaign. — Alex Lakocy

Continued from page 20.
General George S. Patton. His father was happy yet humbled that his class project ultimately became a national competition, Kesler said.

“We have a part of the legacy of this competition that has continued on for more than 40 years,” said CEE Professor David Lange, ASCE student chapter faculty adviser. “It’s known all across the industry. All civil engineers know about the Concrete Canoe Competition, and for Illinois to be hosting this year is a great point of pride.”

The lead organizer of this year’s national competition was CEE Ph.D. student Armen Amirkhanian (MS 12), canoe team graduate adviser. He was pleased with the team’s performance.

“I think they did really well, considering that they’re a very young team, they had never been to nationals before and at regionals they were unable to compete in the races. At regionals, the races were cancelled due to flooding—which is kind of ironic,” Amirkhanian said.

The event as a whole ran smoothly, despite minor glitches like the bad weather on Saturday, Amirkhanian said.

“All the teams were excited to come to campus,” he said. “They were commenting on how nice the campus was. Some of our faculty members led tours of the department throughout the competition.”

Participating on a concrete canoe team challenges students to develop their technical skills, business acumen, artistic ability and presentation skills, said Lange.

“It’s a very broad set of skills that come together in the competition,” he said.

This year’s Illinois concrete canoe team members were Robert Butler, Clare Curtin, Jonathan Daly, Hareem Dar, Sharla Evatt, Luis Garay, Hong Kim (co-captain), Arielle Malinowski, Raphael Stern, Tawa Sulaiman, Min Yin (co-captain), Charlie Yu and Jennifer Zablotny. Their faculty adviser is CEE Professor Jeffery Roesler.

Additional volunteers included Angeli Gamez (MS 12); CEE student Mark Keller, president of the ASCE student chapter; James Meister (BS 06); Colin Rueb (BS 12); and Jacob Thede (BS 12).

In addition to the University of Illinois, sponsors of this year’s competition included the American Society of Civil Engineers (ASCE), which has been administering all the concrete canoe competitions since 1988; the American Concrete Institute; ASCE Foundation; Geico; Dassault Systèmes SolidWorks Corp.; and World of Concrete.
Left top, Clare Curtin (front) and Alexandra Prasauskas in the women's Slalom/Endurance race. Left below, Robert Butler (front) and Min Yin in the men's Slalom/Endurance race. Above and top right, race day t-shirts.

Above (left to right), Randall Over, ASCE President-Elect and CEE professors Jeffrey Roesler and David Lange on race day. At left, the University of Texas at Tyler team duct tapes their canoe after it broke in half on race day. Below, the team and friends at the banquet: (left to right, back row) David Lange, Armen Amirkhanian, Mark Keller, Raphael Stern, Colin Rueb, Jonathan Daly, Luis Garay, Paul Papazisii, Robert Butler, Charlie Yu; (left to right, front row) Dan Levitus, Arielle Malinowski, Alex Prasauskas, Hong Kim, Min Yin, Sharla Evatt, Jennifer Zablotny.

David Kesler (above) speaks at the awards banquet.
Three CEE students win NSF Fellowships

Three CEE students won prestigious National Science Foundation (NSF) Graduate Research Fellowships this year. They are Artin Laleian, Jill McClary and Samuel Rivera.

Artin Laleian (BS 10) is a graduate student pursuing his M.S. degree. His research will examine common simplifications employed in numerical models of the subsurface environment. By removing or reducing these simplifications, existing models can be made more accurate, he said.

Also pursuing his M.S. degree is Samuel Rivera, whose research focuses on using text mining of news articles to monitor sustainability indicators so municipalities can gather the most current information on the impact of their green initiatives.

Jill McClary (BS 13) is a 2013 graduate who plans to attend Stanford University in the fall. Her research will be focused on the development of more effective sensors for common drinking water pathogens, such as viruses, for use in water quality field testing.

Fellows receive three years of support, including a $30,000 annual stipend, $12,000 cost-of-education allowance to the institution, international research and professional development opportunities and access to the XSEDE Supercomputer.

CEE researchers using Blue Waters supercomputer

Two CEE faculty members are among 22 campus research teams that have been awarded access to the Blue Waters supercomputer, which is capable of performing quadrillions of calculations every second and of working with quadrillions of bytes of data. Professor Arif Masud was awarded access for his project, “Variational Multiscale Methods for Non-Newtonian Viscoelastic Blood Flow Modeling: Application to Clot Formation and Dissolution in Patient Specific Models.” Professor Albert Valocchi will use Blue Waters for his project, “Exploring the Physics of Geological Sequestration of Carbon Dioxide using High-Resolution Pore-Scale Simulation.”
Summit in Tanzania focuses on safe water, sanitation

Water and sanitation challenges in the developing world were the topics of an international, three-day Safe Global Water and Sanitation Summit, held Jan. 30-Feb. 1 in Arusha, Tanzania. Organized by the College’s new Safe Global Water Institute (SGWI) and led by its director, CEE Professor Benito Mariñas, the event brought together more than 120 participants from 34 organizations and 12 countries. Their shared goal: to help educate the next generation of professionals from a variety of fields who will work to improve the lives of millions of people worldwide without access to improved water and the billions who lack even basic sanitation.

In addition to shedding light on the problems in these areas, the summit served to ignite passion in the professionals from academia, non-governmental organizations and government agencies who will work in partnership with the SGWI. The summit was held in East Africa, because the water and sanitation challenges facing this region are among the world’s most pressing, yet the technical challenges facing the communities and the cultural constraints involved in solving their problems are often not fully understood, Mariñas said.

“There are many people who have the expertise to contribute to solving these problems, but they really don’t understand the situation in the communities,” Mariñas said.

The summit’s presentations focused on water and its complex relationships to climate change, energy, food security and nutrition. A highlight was an address by the Prime Minister of Tanzania, the Honorable Mizengo Pinda, who delivered the opening address. In addition to Mariñas, CEE faculty members who attended were Associate Professor Tami Bond, Professor Ximing Cai and Assistant Professor Jeremy Guest. Associate Professor Joanna Shisler of the University of Illinois’ School of Molecular and Cellular Biology and Professor Yi Lu of the University of Illinois’ School of Chemistry also participated.

A large group of CEE graduate students representing the various academic disciplines also attended and led a final session of the summit summarizing a strategy for a path forward toward integrating the global partnership.

An important focus of the summit was the necessity of the interdisciplinary approach—collaborating with experts from a variety of disciplines to find truly sustainable solutions to the water and sanitation problems of the developing world. Engineering solutions developed without an understanding of the local culture can be destined for failure, Mariñas said.

“There are religious constraints, there are cultural constraints,” Mariñas said. “If you don’t understand that, it doesn’t matter what technology you are developing with the chemists, biologist and engineers—it’s just not going to work. We need to also involve the social scientists.”

Following the summit, Mariñas remained in Tanzania two more weeks with a group of CEE undergraduate and graduate students as part of his environmental lab course, CEE449. The course teaches laboratory methods to senior undergraduates and includes the opportunity to work on real-world water projects in developing countries. The projects, which take place in either Africa or Mexico, are accomplished with the help of CEE environmental graduate students and partnerships with local universities.

This time, Mariñas and his students utilized as their home base the campus of Nelson Mandela African Institute of Science and Technology in Arusha, Tanzania. CEE Assistant Professor Jeremy Guest and Associate Professor Joanna Shisler also participated in this portion of the trip. The group met with its partners at the university and visited a number of communities in the surrounding area with representatives of non-governmental organizations to learn about the communities’ water and sanitation challenges.

The Safe Global Water Institute is funded by the College of Engineering and the Water CAMPWS.

Full story online at cee.illinois.edu/sgwi_summit

CEE grad student Lauren Valentino, front left, and undergrads Nora Sadik, second from right, Genevieve Nemeth, far right, and Josh Doo, middle front, take water quality samples at a spring in Tanzania, with grad students Jacob Kihila and Honest Kipasika from the Nelson Mandela African Institute of Science and Technology at Arusha.
Assistant Professor Mani Golparvar-Fard’s (PhD 10) company, PAR Works Inc., was named a 2013 Innovations Design and Testing Fellowship Award honoree by the Consumer Electronics Association at the 12th International Conference on Construction Applications of Virtual Reality in Taipei. In addition, Golparvar-Fard, along with Paul Miranda, Hyojoon Bae, Jules White and Jeffrey Reed, received the Best Paper Award for “Enhanced HD4AR for Ubiquitous Context-Aware AEC/FM Applications.”

CEE Ph.D. student Suyun Ham and Associate Professor John S. Popovics won the 2012 American Society for Nondestructive Testing Fellowship Award for their project, “Nondestructive In-place Condition Assessment of Concrete Rail Ties Using Air-Coupled Ultrasound.”

Stanley Herrin (BS 74, MS 75), P.E., the instructor for the department’s airport facility design course, has received the 2013 Airfield Pavement Practitioner Award from the American Society of Civil Engineers and its CEE graduate student Manzoor Hussain and his advisor, Professor Timothy Stark, received the 2012 Thomas A. Middlebrooks Award from the American Society of Civil Engineers Geo-Institute for their paper, “Shear Strength in Preexisting Landslides,” published in the July 2010 issue of the Journal of Geotechnical and Geoenvironmental Engineering. The paper was selected for its contributions to geotechnical engineering.

Professor Praveen Kumar received an Engineering Council Advising Award from the College of Engineering. Associate Professor Liang Liu received an Engineering Council Advising Award from the College of Engineering.

Professor David Lange received the 2013 College of Engineering Teaching Excellence Award from the College of Engineering.

CEE student Jose M. Mier won the Outstanding Student Paper Award at the American Geophysical Union Fall 2012 Meeting, an annual conference that attracts more than 20,000 scientists. He led a presentation entitled “3D LDV Measurements in Oscillatory Boundary Layers,” discussing research he had done with Professor Marcelo H. García at the Ven Te Chow Hydrosystems Laboratory.

Professor Gary Parker, Kory Konsoer and Jessica Zinger had their paper “Bankfull Hydraulic Geometry of Submarine Channels Created by Turbidity Currents: Relations between Bankfull Channel Characteristics and Formative Flow Discharge,” highlighted in the American Geophysical Union’s magazine, Eos.

Professor Emeritus Marshall Thompson (BS 60, MS 62, PhD 64) recently received the Asphalt Institute’s Distinguished Service Award. This prestigious award is conferred to individuals who have contributed significantly to the asphalt industry through either technical achievement or substantial contribution of leadership.

Professor Emeritus Marshall Thompson received the Safe Water Scholarship from Illinois Section American Water Works Association (ISAWWA). It is awarded to those who promote public health by providing drinking water in sufficient quality and quantity. Zhang works on improving detection methods of bacterial indicators that monitor the presence of waterborne pathogens in drinking water.

Thank you

The department gratefully acknowledges the following companies, who sponsored lunch at the spring 2013 job fair.

Langan Engineering and Environmental Services
Wiss, Janney, Elstner Associates
Bowman, Barrett & Associates
Sargent & Lundy
Ciorba Group

For information about recruiting at the fall job fair, visit cee.illinois.edu/jobfair.

Structures courses now offered online

Structural engineering and mechanics courses are now offered online as part of the department’s online master’s degree program, and students will now be able to pursue the M.S.C.E. degree in the area of Structures. Online course offerings now include 45 classes across a range of CEE areas.

cee.illinois.edu/ceeonline
Academic advisory board visits CEE

Members of CEE’s newly established Academic Advisory Board met on campus February 11-12 for the first time.

The inaugural board is comprised of Linda Abriola, Dean of Engineering at Tufts University; Nicholas Jones, executive vice president and provost of the Pennsylvania State University; David Daniel, President of the University of Texas at Dallas and former Head of CEE at Illinois; Andrew Whittle, Head of Civil and Environmental Engineering at Massachusetts Institute of Technology; Glen Daigger, Senior Vice President and Chief Technology Officer at CH2M Hill; and Robert Street, Professor Emeritus of Civil and Environmental Engineering at Stanford University. Three members of the board attended the meeting in person, and the other three connected remotely and/or contributed to the discussions by correspondence and comments on the material prepared for the visit.

The advisory board will advise on all aspects of department operations, including curricula, education, research, governance, finances, climate, outreach and global engagement. The focus of the first meeting was to inform the board members on the status of the department and discuss future research directions.

The group also had lunch with about 20 students to learn more about the student experience at Illinois.

The board will meet on campus once a year. Terms of service are for four years, renewable once.
IDOT announces $2.6M partnership with ICT

By Nichole Evans

Illinois Department of Transportation (IDOT) Secretary Ann L. Schneider announced a $2.6 million dollar three-year partnership with the Illinois Center for Transportation (ICT), headquartered within CEE at Illinois, to fund the Illinois Sustainability Transportation Program. The announcement was part of the Kent Distinguished Lecture Schneider presented in which she laid out IDOT’s long-range transportation plan.

“IDOT has demonstrated a long-term commitment to sustainable practices, carrying out research and implementing green technologies in our daily operations,” said Schneider. “This partnership will allow IDOT to broaden its focus on sustainable technologies and provide dedicated staffing to oversee sustainability research and implementation in the years to come.”

The Illinois Sustainability Transportation Program will focus on innovative, applied research and technology transfer to promote energy conservation and green practices for planning, design, construction, operation, preservation, and control of highway systems and other transportation modalities, said Imad Al-Qadi, ICT Director, said.

“The focus of this program will be on transportation infrastructure and efficient movement of people and goods, while maintaining an environmentally balanced and socially responsible approach,” he said.

Sustainability through environmental conservation and improved quality of life is a key component of IDOT’s long-range plan. In her lecture, Schneider outlined several strategic priorities that are driving the plan:

- Increasing safety
- Supporting economic vitality
- Increasing security
- Increasing accessibility and mobility
- Enhancing connectivity and integration
- Promoting efficient system management and operation
- Preserving existing transportation systems

One initial focus of the partnership will be research that aims to increase the use of recycled materials in hot-mix asphalt (HMA). Currently, there is much attention on incorporating recycled asphalt shingles (RAS) into HMA. RAS contains a high percentage (18-30 percent) of asphalt binder, which is the most expensive part of HMA. By determining how to best create HMA using RAS, ICT researchers can assist in diverting some of the 25 million tons of asphalt shingles that end up in landfills annually—in addition to creating a significant cost savings since fewer virgin aggregate materials will be used.

“Pavement sustainability is going to be of great importance in the coming years,” Al-Qadi said. “We at ICT are taking the lead on projects that will preserve natural resources and preserve economic competitiveness.”

Schneider’s presentation on IDOT’s strategic long-range plan was this year’s Paul Fraser Kent Distinguished Lecture. The lecture series was established in 2007 and honors outstanding leadership in the field of transportation engineering.

Full story online at ict.illinois.edu/newsletter/May-2013/Schneider-Kent-Distinguished-Lecture.aspx

Hanson pledges major gift to rail program

The Rail Transportation and Engineering Center (RailTEC) received a $150,000 gift from Hanson Professional Services Inc. of Springfield, Ill. The gift, to be issued over five years, renews the company’s continued commitment to railroad engineering and the University of Illinois.

The company previously pledged $150,000 over five years in support of RailTEC. That gift helped fund a new teaching position and expand the railroad engineering program. Founded in 1954 by U of I alumnus and former civil engineering faculty member Walter E. Hanson (MS 47), the company has been a longtime supporter of the program.

“Hanson has been an invaluable partner in our efforts to rebuild the U of I rail program, and we are deeply grateful,” Professor and RailTEC Executive Director Christopher Barkan said. “Their support has made it possible for us to teach several new cutting-edge courses in rail engineering, thereby attracting many more students and encouraging them to pursue careers in the rail industry.”

“Hanson is committed to advancing the field of railroad engineering, and we’re proud to continue our support of RailTEC and the University of Illinois,” said Sergio “Satch” Pecori, P.E., ExecEng, (BS 73, MS 74) Hanson’s president and chief executive officer and a CEE alumnus.

Full story online at cee.illinois.edu/hanson_gift_2013.
Black carbon significant cause of global warming

Black carbon is the second largest man-made contributor to global warming and its influence on climate has been greatly underestimated, according to the first quantitative and comprehensive analysis of this issue by a team including CEE Associate Professor Tami Bond as co-lead author.

The landmark study published in the Journal of Geophysical Research-Atmospheres in January indicates that the direct influence of black carbon, or soot, on warming the climate could be about twice previous estimates. Accounting for all of the ways it can affect climate, black carbon is believed to have a warming effect of about 1.1 Watts per square meter (W/m²), approximately two thirds of the effect of the largest man made contributor to global warming, carbon dioxide.

The study, a four-year, 232-page effort, led by the International Global Atmospheric Chemistry Project, is likely to guide research efforts, climate modeling, and policy for years to come.

The report’s best estimate of direct climate influence by black carbon is about a factor of two higher than most previous work. The results indicate that there may be a greater potential to curb warming by reducing black carbon emissions than previously thought, but the international team urges caution because the role of black carbon in climate change is complex.

Based on the analysis, black carbon emission reductions targeting diesel engines followed by some types of wood and coal burning in small household burners would have an immediate cooling impact.

Full story online at cee.illinois.edu/bond_blackcarbon_jan2013.

Topology optimization connects architecture and engineering

Engineers and architects have a new way to collaborate in the design of buildings thanks to the work of Professor Glaucio Paulino, who is applying the 3-D computer modeling technique of topology optimization in innovative ways. Together with CEE alumnus and adjunct faculty member William F. Baker (MS 80), Paulino has developed a tailored software framework that allows design teams of engineers and architects to generate structurally sound design alternatives while minimizing material consumption, resulting in creative, sustainable designs that integrate form and function in a synergistic way.

Engineers have used topology optimization for decades to create custom designs that satisfy certain requirements and constraints. The method is prevalent in the automobile and aerospace industries, but Paulino’s work has further developed the technique for additional applications. In 2010, he collaborated in a National Science Foundation-sponsored project with cancer surgeon Dr. Michael Miller at the Ohio State University to apply topology optimization to the problem of designing bone replacements for facial reconstruction patients. This work was published in the Proceedings of the National Academy of Sciences. His latest work has been in tailoring the technique toward tall building design, for which he has teamed up with Baker, Structural Engineering Partner for Skidmore, Owings & Merrill LLP in Chicago. An expert in the engineering of tall buildings, Baker is best known for designing the “buttressed core” structural system for Dubai’s Burj Khalifa, the world’s tallest manmade structure.

“Topology optimization allows us to really explore our creativity,” Paulino said. The work is supported by the National Science Foundation.

Full story online at cee.illinois.edu/topology_optimization_jan13
What if you could get information about something immediately, just by taking a picture of it with your cell phone or iPad? Whether you were house-hunting, trying to jump-start your car, or managing a construction project, a wealth of customized information would be available to you, just by taking a photograph with your mobile device. That’s the promise of new technology developed by CEE Assistant Professor Mani Golparvar-Fard and collaborators Professor Jules White and graduate research assistant Hyojoon Bae of Virginia Tech.

The team’s Mobile Augmented Reality System (MARS) uses advanced computer vision and image recognition techniques and a store of customized data on a server to offer the user access to detailed information presented as overlays on the photo. The stored information can be as elaborate as desired. A person looking at real estate could touch on various features of a property and get information, additional photos or even video. Someone trying to jump a car could see step-by-step instructions referencing the user’s own engine photo. In the case of construction project monitoring, the user could access 3-D project models, project specifications, or schedule information. The system can be customized for a variety of uses.

Full story online at cee.illinois.edu/mars_jan13.

Emeritus luncheon

Professors emeritus and guests gathered in the Yeh Center March 12 for a luncheon that the department plans to make an annual tradition. Professor and Head Amr Elnashai gave a department update. Left to right: Professors emeritus Wayland Eheart, Jamshid Ghaboussi, Fred Lawrence, Jon Liebman, Marshall Thompson, Moreland Herrin and Ed Herricks, Professor and Head Amr S. Elnashai, Professors emeritus Barry Dempsey, Bill Hall, Vern Snoeyink, Jim Long, Pete Lenzini, German Gurfinkel, Bill Walker and Bill Gamble.
Old Masters
Engineering giants of the department’s history

Munse
1919-2008
Educator, researcher, engineer

William H. Munse was born on July 19, 1919, in Chicago to Martha and William C. Munse. Following his grammar school and high school education in Chicago, he attended the Armour Institute of Technology in 1937-40. Thereafter he transferred to the University of Illinois at Urbana-Champaign, where he earned a B.S. degree in 1942 with honors, majoring in structures and hydraulics, and an M.S. degree in 1944 with a major in structures.

From 1944 to 1946, Munse served as a U.S. Naval Officer at Los Alamos Laboratory. He subsequently undertook additional graduate study at Lehigh University during 1946-1947. After returning to the University of Illinois in 1947, he joined the civil engineering faculty at Illinois, becoming a Professor of Civil Engineering in 1955, until he retired in 1981. He served as a visiting professor at the University of Newcastle, Australia for a short period of time in 1973.

Professor Munse’s early professional experience, from 1936-1943, involved work with the General Electric X-Ray Corporation of Chicago, the Champaign City Engineer’s office and the American Bridge Company. His later university research centered on static, fatigue and brittle fracture behavior of riveted, bolted and welded metal steel construction, especially the difficult area of connections, where his work markedly improved the design standards still used today for modern steel structures. He was active in important society committees, serving for example as Founding Chairman of the Task Committee on Structural Fatigue (1965-68) of the American Society of Civil Engineers (ASCE) and years of service on the Administrative Committee on Metals of ASCE. In addition to an active teaching career where he passed on the results of his research to his students, Munse carried on active consultation with numerous governmental agencies and industrial firms. Munse was author or co-author of more than 140 major publications, many of which continue to be referenced.

Over his career, Munse received numerous awards, including the Certificate of Recognition from the Office of Scientific Research and Development under the National Defense Research Committee for research on reinforced concrete beams under impact loading, and in 1946 a certificate of recognition from the War Department for participation in production of the atomic bomb. Other awards include the Adams Memorial Membership Award of the American Welding Society, the Walter L. Huber Civil Engineering Research Prize of ASCE in 1961, in 1976 the Distinguished Service Award from the Japan Welding Society, elevation to Honor Member status in Chi Epsilon, the honorary society of civil engineers, and Honorary Membership in the American Society of Civil Engineers in 1983.

Munse’s willingness to contribute openly for the betterment of the profession, through his teaching in the classroom and his research in the laboratory and through his professional society and technical committee activities, was a continuing source of inspiration to his students and colleagues. His contributions were numerous and of great significance to the engineering profession.

Munse passed away on January 9, 2008, in Champaign.
2012 CEE Student Awards

A. Epstein Award in Civil Engineering
Matthew Jarrett
Christine Rhoades

Alvord, Burdick & Howson Award
Reshma Williams

Anna Lee and James T.P. Yao Scholarship
Michael Kuo

ASCE Outstanding Instructor Award
John Popovics

ASCE Outstanding Student Award
Raphael Stern

Bates and Rogers Scholarship
Gilberto Chaidez Jr.

Bates and Rogers Scholarship
Allison Densler

Bowman, Barrett & Associates Outstanding Scholar Award
Andrew Bishop

C. E. De Lauw Travel Award
Laura Ghosh
Ryan Smith

C.S. and Ruth Monnier Scholarship
Tim Lalla
Arsal Manzoor

Carroll C. Wiley Traveling Award
Raphael Stern

CH2M Hill Transportation Endowed Scholarship
Maria Warnock

Chester P. Siess Award
Piyush Chaunsali
Lu Zhang

Chicago Outer Belt Contractors Association Scholarship
Scott Schmidt

Civil and Environmental Engineering Faculty Advising Awards
Larry Fahnstock

Civil Engineering Class of 1943 Undergraduate Leadership Award
Savannah Goodman

Clement C. Lee Outstanding Scholar Award
Xingan Kan

Crawford, Murphy & Tilly Award
Rajarshi Bhakta

CRSI Education and Research Foundation Scholarship
Kexin Chen

Delores Wade Huber Scholarship
Christine Daul
Cory Mosiman
Justin Vogel

DFI Educational Trust Berkel & Company Contractors Inc. Scholarship
Ryan Chan
Sandra Peters
Min Yin

Doris I. and James L. Willmer Endowed Scholarship
Lauren Cannon

Earle J. Wheeler Scholarship
Justin Cruce
Zhengboyang Gao

Eli W. Cohen – Thornton Tomasetti Foundation Scholarship
Alex Lakocy

Ernest L. Doctor Memorial Award (IAPA)
Kuan Yu Ko

George L. Farnsworth Jr. Scholarship
Marika Nell

Geotechnical Scholarship Gift
Daniel Rhee

Golf Course Builders Association of America Foundation Scholarship (GCBAA)
Luke Livers

Grant W. Shaw Memorial Scholarship
Iek Heilstedt
Don Jurkowski
Daniel Malsom

Harold R. Sandberg Scholarship
Veronika Tomanova

Photos top to bottom: Marika Nell receives the George L. Farnsworth Jr. Scholarship from Associate Head Liang Liu. Allison Densler receives the Bates and Rogers Scholarship from Professor Charlie Werth, Associate Head. Assistant Professor Larry Fahnstock, left, accepts the CEE Faculty Advising Award from Professor Liang Liu, Associate Head. Mark Keller, center, presents the American Society of Civil Engineers (ASCE) Outstanding Instructor Award to Associate Professor John Popovics, left, and the ASCE Outstanding Student Award to Raphael Stern, right.
Harry R. Hanley Memorial Scholarship
Joseph Staats

Harvey Hagge Concrete Scholarship
Daniel Gancarz

Henry T. Heald Award
Justine Brakefield

Illinois Association of County Engineers Award
Amanda Budnik
Jeffrey LaHucik
Daniel Rivi
Cody Suba

Industry Advancement Foundation of Central Illinois Builders of the AGC Scholarship
Richard Gutierrez

Ira O. Baker Prize — First Prize
Matthew Jarrett

Ira O. Baker Prize — Second Prize
Raphael Stern

Ira O. Baker Memorial Scholarship
Timothy Chan

Jack and Kay Briscoe Scholarship
Cassie Dumoulin
Zachary Henderson
Charles Pugh
Armando Sanchez
Chloe Schmidt

Klein and Hoffman Inc. Scholarship
Aditya Nagpal

Koch Scholarship in Civil and Environmental Engineering
Trevor Murphy

Leigh F. J. Zerbee Scholarship Civil Engineering
Erich Maxheimer

Maude E. Eide Memorial Scholarship
Yuting Chen
Yiwen Xu

Max Whitman APWA Memorial Scholarship
John Witter

Melih T. Dural Undergraduate Research Prize
Daniel Mosiman

Moreland Herrin Scholarship
Sarah Klarich

Norman Carlson Scholarship
Anna Delheimer
Matthew Greve

RJN Foundation Civil Engineering Scholarship
Kenny Chavez

Road Builders Charities Scholarship
Jenna Diestelmeier

The Lawrence J. and Margaret J. Fritz Undergraduate Scholarship
Katherine Matthews

Walker Parking Consultants Scholarship
Paul Papazisi

Walter E. Hanson Graduate Study Award
Megan Wallace

Walter L. and Carole A. Crowley Scholarship
Matthew Jarrett

Wayne C. Teng Scholarship
Corey Aumiller
Juzer Millwala
Shivani Soni

William A. Oliver Endowed Scholarship
Sarah Bassett

William C. Ackermann Sr. Civil Engineering Scholarship
Michael Weiss

William E. O’Neil Award
Aslihan Karatas

William E. Stallman Scholarship in Civil and Environmental Engineering
Jessica Reifschneider

William John MacKay Award
Alex Knicker
Mona Patel

Photos top to bottom: Professor and Head Amr Elnashai, center, presents the Baker Prize to Raphael Stern (second), left, and Matthew Jarrett (first). Recipients of the Grant W. Shaw Memorial Scholarship, left to right: Alex Heilstedt, Daniel Malsom and Don Jurkowski. Michael Weiss receives the William C. Ackermann Sr. Scholarship from Bill and Coletta Ackermann. Mona Patel, left, and Alexandra Knicker receive the William John MacKay Award from Ray Ackerman (BS 43).
Online program gets first alumnus

2010s

Melissa Duyar (BS 2013) has been hired as a Water Resources Staff Engineer at Manhard Consulting, a civil engineering firm headquartered in Vernon Hills, Ill.

Angeli Mariz Gamez (MS 12) received the Helene M. Overy Memorial Scholarship from the Women's Transportation Seminar (WTS) Chicago Chapter this year. The scholarship was established by the WTS in 1981 to encourage women to pursue career paths in transportation.

Assistant Professor Mani Golparvar-Fard (PhD 2010) was a recipient of the 2013 James R. Croes Medal from the American Society of Civil Engineers. Golparvar-Fard was honored for the paper, “Integrated Sequential As-Built and As-Planned Representation with D4AR Tools in Support of Decision-Making Tasks in the AEC/FM Industry,” published in the December 2011 issue of the Journal of Construction Engineering and Management. Also honored with Croes Medals were co-authors Feniosky Peña-Mora, the Edwin Howard Armstrong Professor of Civil Engineering and Engineering Mechanics at Columbia University, and Silvio Savarese, an assistant professor in the Department of Electrical and Computer Engineering at the University of Michigan.

CEE student Aaron Leopold (BS 13) and Ph. D. student Navid Jafari (MS 11) were awarded second place in the GeoPrediction competition at the 2013 Geo-Congress Conference, an annual conference for the geotechnical engineering profession, for their report and presentation on the groundwater table conditions at the time of a slope failure.

Jackson Kontny (BS 12) recently joined Hanson Professional Services Inc’s headquarters in Springfield, Ill., where he will serve in the firm’s railway market while assisting the water resources team.

2000s

Ryne Fiorito, P.E., (BS 08) recently celebrated five years of service with Hanson Professional Services Inc. He serves the power and industry market at the company’s Springfield, Ill., headquarters.

Michael Giannetta, P.E., (BS 04) has been hired as a project engineer by Manhard Consulting Ltd., a civil engineering firm headquartered in Vernon Hills, Ill.

Shady Hajjar (BS 04) was named Midwest District Manager of RoadSafe Traffic Systems Inc. Hajjar will now be responsible for operations within the District including staffing, production, inventory, safety, and revenue and earnings.

Sarah Morgan (BS 03, MS 05) was named to Engineering News-Record’s first-ever list of “Top 20 Under 40,” a list of young professionals in Alaska, Oregon and Washington who represent the leading edge of design and construction industries. Morgan is the Senior Project Engineer at Golder Associates Inc. in Redmond, Wash.

1990s

Russel Green (MS 94), an associate professor of civil engineering in the College of Engineering at Virginia Tech, has received the university’s 2013 Alumni Award for Excellence in International Research. Since 2008, Green has been heavily involved in international research in engineering seismology and earthquake engineering with the objective of lowering the risk of damage from future earthquakes worldwide. He and his students have worked in New Zealand, Japan, Iceland, Haiti, Dubai and China, among others.

The company founded in 2003 by Danyetta Magana (BS 97), Covenant Security Solutions Inc., was recently recognized by Diversity Business as one of the "Top 500 African-American Owned Businesses" in 2012. Magana’s company assists clients with a full approach to cyber security. In addition, Magana...
Jon Khachaturian (BS 78), Versabar president, speaks at December commencement

Jon Khachaturian, P.E., (BS 78), president of Versabar Inc. and an adjunct faculty member in the Department of Civil and Environmental Engineering, delivered the winter commencement address on Dec. 22. Here are some excerpts from his speech.

W

e all have our own stories about how we got here. Some of us knew what we wanted to do, and that was your goal and you’ve done it—wow! Some of us didn’t and had a few distractions along the way.

I myself entered the University of Illinois in the College of Liberal Arts in the area of general studies, which I thought was a masterful choice; you could study anything! I did fairly well. After two years, I had a solid GPA. I had taken entomology—that’s the study of bugs—astronomy, the history of England (three semesters!) and I was looking whether to study Russian or another acting class, when at the beginning of my junior year I got an official-looking letter from the U of I administration which I thought might be an award for diversity of curriculum. So I opened it and was dismayed to read a curt, short letter that said essentially, either declare a major or get out! And I was in a state of panic! This was ruining everything! I was on the football team. I could take the courses I wanted, I had plenty of time. I really wasn’t thinking about any commitments at the time.

So I ran to my father, who was on the faculty in the civil engineering department.

“Dad, they’re throwing me out! They’re throwing me out!”

He said, “Well, what are you going to do?”

“I don’t know.

“It may be time for you to go see Dean Bokenkamp.” (Who was the man I would talk to, to try and get into the civil engineering department.)

I said, “Dad, are you crazy? Those people study all night!”

“You like to solve problems. You should think about it. Or else, you’ve had a great summer job roofing (for White roofing in Sidney). Maybe you should try and get on there for a year or two and think about it.”

And then he went back to what he was doing. And I was sitting there and had just finished a summer of roofing and had been on the top of the Homer church steeple. That’s where you nail your own toe boards. It’s like packing your own chute if you’re a skydiver. You’re on the top of the steeple, and you’re responsible for your own nails. And I’m thinking.

“So Dad, where do I find this Dean Bokenkamp?”

He gave me the contact number, and I left with his encouraging words, which were, “And son, don’t use my name.”

So it all went well with the dean. I think he liked football and was impressed I was on the team. He was a little skeptical of my grasp of Physics. But with my GPA—and I was enthusiastic about every kind of knowledge at that time—he said, “We’ll accept you in civil engineering.” And it was perfect. It was a place for new ideas and solving problems.

There are three things that I will leave you with today that I think are critical for success. The first one is honesty. You have to be honest especially with yourself to find the answer. If you don’t find the right answer, your design won’t work. If you’re honest with yourself, you’ll find your way.

The second thing is creativity. Creativity and innovation are what we do. Engineers were born to create, and you need to be careful that you don’t lose the forest for the trees. Because we get down to the mechanics of the project and sometimes we forget what we’re doing. So you need to zoom out as you’re working on different things. Remember the ultimate goal—it really drives the details—engineering equals creativity.

The other thing is confidence. You have the basic fundamental skills to be great engineers. Now, I’ve traveled all over the world and we’ve done projects on every continent. I’m telling you this: you are the best of the best. The University of Illinois is an institution you can be proud of, that you can be confident in. And the sky’s the limit if you’ll apply what you’ve learned here and if you’ll apply what you’ve had to apply to get here.

Finally, because my 10 minutes are almost up, when you are successful—and you will be successful—remember your old college. Stay in touch. One of my greatest pleasures has been to come back and see the professors who taught me, the new faculty, see old friends, talk to people who are still in this area. Go to a football game and stay in touch with your college! You might be able to give an address someday, who knows.

I’m an adjunct professor. That was quite an honor to be an adjunct professor at the University of Illinois. I did find out that “adjunct” is an old Egyptian hieroglyphic that used to mean, “Oh please, send more money.” But that’s what I want you to think about as you advance and do well. Think about an investment, so that another group can come behind you. So we can maintain our standing as maybe the greatest engineering institution on the face of the earth.

Congratulations on your achievement! Good luck! We’re here, we’re looking forward to hearing from you, we’re cheering for you, and God bless!
The department welcomed a new Director of Advancement in December. John Southwood, a fundraising professional with nearly 30 years of experience, joined CEE in December. A University of Illinois alumnus, Southwood came to the university from a position as Chief Advancement Officer for Georgia Highlands College in Rome, Ga. He has worked at U of I before, having been on staff at the Division of Intercollegiate Athletics from 1985-1993.

“I’m delighted to be back with the university and working for a prestigious college and top-ranked department such as Civil and Environmental Engineering,” Southwood said. “I am proud to say I began my professional career at the University of Illinois, and I am returning to complete my career here at my alma mater.”

As Director of Advancement, Southwood will lead the department’s fundraising program. His professional experience includes posts in higher education, including working for the U of I, Chattahoochee Technical College and Georgia Highlands College. He has also worked in advancement for two Atlanta-based nonprofit organizations, Big Brothers/Big Sisters and Junior Achievement.

Southwood holds two degrees from the University of Illinois: an M.S. in Athletic Administration (1985) and a B.S. in Business Administration (1982).
More than 65 years after completing his military service in World War II, CEE Professor Emeritus and department alumnus William J. Hall (MS 51, PhD 54) was invited to commemorate it. Accompanied by his son, Hall traveled to Washington, D.C., Oct. 18-19 with the Honor Flight Network, a nonprofit organization that honors America’s military veterans with two-day, all-expenses-paid trips to visit the capital’s war memorials. Hall served in World War II in the Pacific theater as a midshipman with the Merchant Marine.

“The whole trip was well planned, expertly executed, impressive and personally moving,” Hall said.

Bill Hall, left, sits with his son, James, at the World War II Memorial.

The Central Illinois Honor Flight included 65 veterans in all and another 65 guardians; each veteran was asked to bring a guest to accompany him or her. Guardians pay their own way on the trips, which are free to veterans thanks to private donations to the Honor Flight Network. The Central Illinois Honor Flight departed from Willard Airport early on Oct. 18 and returned in the evening on Oct. 19. While in D.C., the group visited the memorials of Iwo Jima, the Air Force, the Navy, World War II, Vietnam and the Korean War, as well as Arlington National Cemetery, two Smithsonian museums—the National Museum of American History and the National Air and Space Museum—and the Lincoln Memorial.

Hall was accompanied by his son James F. Hall (MS CEE 80, MS ECE 85), a University of Illinois alumnus and electrical engineer at the General Motors plant in Spring Hill, Tenn.

“There were three things on this trip that really touched me,” the younger Hall said. “First, being able to visit the recently completed World War II monument with my father, who is one of the many it was built to honor. Second, each of the veterans was often approached by passersby who stopped to say, ‘Thank you for your service.’ This meant a lot to them, and I encourage you to do the same when you see a veteran. And third, the tremendous hero’s welcome we received upon returning to the Willard Airport, even in the cold rain—emergency vehicle lights flashing, band playing, cheerleaders, and all the people that lined up en masse—most importantly my mother, Elaine—to welcome these WWII veterans home again.”

During Hall’s seven-month tour of duty from September 1944 to March 1945, he served on the Haiti Victory cargo ship, which traveled across the Pacific carrying war supplies. His duties included navigation, communications, watch and serving as an anti-aircraft gunner.

“The major hazards encountered are best described as submarines, aircraft bombing and snipers on Saipan,” he said. “I thank God every day that I survived.”

Still active in the department, Hall retired in 1993 after a 40-year career as a member of the structural engineering faculty. He served as department head from 1984-1991.

“Truly, this fantastic and superbly managed trip was among the top trips of my lifetime,” he said.

For information about the Honor Flight Network, visit honorflight.org.

Professor Emeritus William J. Hall is pictured in front of the Washington Monument.
Robert Steen (BS 80) has retired from the U.S. Army after 33 years of military and civilian service. He lives with his wife, Brenda, in Elizabethtown, Ky., and remains active with church, local charities and lots of home improvement projects.

Sharon L. Wood (MS 83, PhD 86) was named to the National Academy of Engineering. Wood is the Robert L. Parker Sr. Centennial Professor and chair of the Department of Civil, Architectural and Environmental Engineering at the University of Texas, Austin. She was honored for design of reinforced concrete structures and associated seismic instrumentation for extreme loading and environments.

Susan Uhlarik (BS 84), the senior project manager at Mcl Shane Construction Co., recently received the “Outstanding Project Manager of 2011-2012” award from the members of the Associate of Subcontractors and Affiliates.

1970s

David Darwin (PhD 74), Deane E. Ackers Distinguished Professor of civil, environmental and architectural engineering at the University of Kansas, is now chair of that department.

Bruce R. Ellingwood (BS 68, MS 69, PhD 72) was a 2013 recipient of the College of Engineering Alumni Award for Distinguished Service. He was recognized for his leadership in the development of reliability-based design standards for structural codes; development of the new field of structural reliability and probabilistic approaches; and participation in educating generations of engineers and professors.

Bob Hawes (BS 72) has announced his retirement as the public works director for the City of Rock Island after 31 years of service.

1960s

Alfred J. “Skip” Hendron (BS 59, MS 60, PhD 63) was selected as the 49th recipient of the 2013 American Society of Civil Engineers Karl Terzaghi Award. At the ceremony, he presented his paper on “Improving Dam Safety with Lessons Learned from Case Histories of Dam Failures and Unacceptable Dam Performance.”

Ben Kacyra (MS 65), the founder of the Oakland-based nonprofit organization CyArk, designed a laser scanner with a group of engineers in spring 2011. The device makes highly accurate 3-D digital blueprints of dangerous sites that are hard for surveyors to access and preserves historic monuments and landmarks. CyArk and Kacyra are working to preserve Mission Dolores, San Francisco’s oldest standing structure.

Richard Pattarozzi (BS 66) has been appointed to the Board of Directors of Environmental Drilling Solutions.

Shamsher Prakash (MS 61, PhD 62) was honored with the Bharat Jyoti Award for exemplifying services to India and the U.S., adopting children in India for full support of their education and developing scientific programs in yoga and peace of mind. Prakash is an international expert in geotechnical earthquake engineering and soil dynamics, the president of the Shamsher Prakash Foundation USA and an emeritus professor at the Missouri University of Science and Technology.

1950s

Fred R. Beckman (BS 53) died May 31. He was 82. The majority of his career was spent at Chicago Heights Steel. He joined the American Institute of Steel Construction (AISC) as director of bridges in 1980 and retired 14 years later in 1994. He was known as one of the nation’s most recognized experts on steel bridge fabrication, and in 2002 received an AISC Lifetime Achievement Award in special recognition of his many years of exceptional service to AISC and the structural steel design, construction and academic communities.

John Cousins (MS 56) died March 28. He was 84. A veteran of the Korean and Vietnam wars, Cousins served in the U.S. Army Corps of Engineers for 28 years, achieving the rank of colonel. Over the course of his engineering career, he served in the Corps of Engineers’ Ohio River District Office and the Ohio Department of Natural Resources, as Chief of the Division of Water. He was also a longstanding member of the American Society of Civil Engineers.

Robert Lenzini (BS 54) died February 13. He was 80. While at Illinois, Lenzini became the first University athlete selected for the Scholastic All-American Team. Upon graduation, he served as an aviator in the U.S. Army Corps of Engineers for three years. In 1977, he co-founded the consulting civil engineering firm of Hampton, Lenzini and Renwick Inc., and later served as a director on the Civil Engineering Alumni Board. In 2002, Lenzini was honored with the University of Illinois Civil and Environmental Engineering Distinguished Alumnus Award.

1940s

Robert Briscoe (BS 49) died January 24. He was 93. After serving in World War II as an Army Air Corps lieutenant, he returned to college at the University of Illinois. He graduated summa cum laude from the College of Engineering and was a member of the Illinois Society of Professional Engineers. Later, Briscoe worked as a civil engineer for J.L. Simmons Co., General Contractor.

Robert Steen (BS 80) died February 17. He was 75. Upon graduation from Illinois, Anderson served with the U.S. Army Corps of Engineers Research and Development in Fort Belvoir, Va. In Chicago, he joined his father at H. Ray Anderson & Associates General Contractors, working as the president and operating manager until his retirement in 2001.

Terrance McGillivray (BS 69) died March 25. He was 66. McGillivray was the former president and CEO of PMB Engineering in San Francisco. He also founded and owned Mendocino Engineering in Ukiah, Calif., in 1993.
W. Gene Corley
Forensic engineering expert

W. Gene Corley (BS 58, MS 61, PhD 62), one of the world’s foremost experts in forensic engineering, died March 1, 2013, in Glenview, Ill. He was 77.

Although Corley was well known for many important contributions to the profession, perhaps his highest contribution to our country arose when the American Society of Civil Engineers and the Federal Emergency Management Agency asked him to spearhead the engineering investigation into the collapse of the twin towers of the World Trade Center after the terrorist attacks of September 11, 2001. Corley carried out this complicated forensic investigation with a high level of demonstrated competence and handled the major questioning and national political aspects with great professionalism.

Corley developed his expertise in forensic engineering through his involvement in the investigation of the 1993 fatal fire at the Branch Davidian complex in Waco, Texas. In 1995 he led the engineering investigation after the bombing of the Alfred P. Murrah Federal Building in Oklahoma.

At the University of Illinois at Urbana-Champaign, Corley in 1958 earned the highest honor given to graduating undergraduates, the Baker Prize. He did his doctoral studies under Chester P. Siess, writing his thesis on reinforced concrete. Following receipt of his doctoral degree, Corley served in the U.S. Army Corps of Engineers for three years, followed by positions with the Portland Cement Association and the associated CTL Group. He chaired ACI Committee 318 for six years and was active as chair or member on scores of committees under the American Concrete Institute (ACI) and the American Society of Civil Engineering (ASCE). He was particularly active in improving building code provisions and advanced material applications. He was one of the founders of the National Council of Structural Engineers Associations (NCSEA).

Corley received many honors, including election to the National Academy of Engineering in 2000. In 2001, he was elected to Distinguished Membership in ASCE and in 2003, he was named an Honorary Member of ACI. At the University of Illinois, Corley was honored as a Distinguished Alumnus of the College of Engineering (2001) and a Distinguished Alumnus of the CEE department (1995). In 2008, the student chapter of Chi Epsilon named him a Chapter Honor Member. At one time he served as president of the CEE Alumni Association.

He is survived by his wife of 53 years, Lynd, three children, Anne, Bob and Scott, and nine grandchildren.

—William J. Hall

Delbert McCulley
Longtime staff member

Delbert McCulley, former business manager of the Department of Civil and Environmental Engineering from 1951 until 1987, passed away on Feb. 27, 2013, in Urbana.

A WWII veteran, McCulley served in the U.S. 12th Armored “Hellcat” Division from 1943 to 1946, with service in France and Germany, and was discharged honorably as a sergeant with citations. In 1946 he reentered the College of Business Administration at the University of Illinois at Urbana-Champaign, and graduated in 1947. Subsequently he gained experience in several firms before joining the civil engineering department, where he worked for 36 years until retirement.

His contributions to the operations of the department were immense. He provided invaluable service to thousands of students, faculty and staff over the years. He is survived by his wife, Eileen, and four daughters and their families.

—W.J. Hall

Please send news of alumni deaths to celeste@illinois.edu.
Chicago-area alumni, CEE faculty, students and friends of the department gathered March 6 at the Union League Club in Chicago for the annual CEE at Illinois Alumni Dinner in Chicago. The event included a cocktail reception, dinner, the presentation of the CEE Alumni Association awards, and a department update by Professor and Head Amr S. El-nashai. Assistant Professor Jeremy Guest also spoke about his research.

Also that night, the University of Illinois Alumni Association presented John L. Carrato (BS 79, MS 80) with the University of Illinois Constituent Leadership Award, recognizing his exceptional service and leadership, and in appreciation for his efforts as President and member of the CEE Alumni Association Board.

With gratitude, CEE acknowledges the following dinner sponsors:

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**Assistant Professor Jeremy Guest talks about his research.**

**From left, Matt Parkolap (BS 08, MS 10), Brett Zitny (BS 08, MS 11), Jonathan Bulger (BS 08, MS 09), Justin Lewis (BS 07, MS 08), Mark Hampton (BS 06) and Peter Loduha (BS 08).**

**From left, Kate Carrato, Diane M. Campione (BS 79, MS 81) and Karen Carrato.**

**From left, Charles Creager Jr. (BS 10), Gregory D. Cargill (BS 71) and Kenneth M. Floody (BS 83).**
2013 CEE Alumni Awards

The Civil and Environmental Engineering Alumni Association is pleased to announce the 2013 recipients of its Distinguished Alumnus/Alumna Award and Young Alumnus/Alumna Achievement Award. The Distinguished Alumnus/Alumna Award recognizes professional accomplishments or unique contributions to society by alumni of the department. The Young Alumnus/Alumna Achievement Award recognizes recent graduates who have achieved distinction in their fields and reached a level of accomplishment significantly greater than that of other recent graduates. The honorees were recognized at the Chicago Regional Dinner Meeting in March.

Honorees of the evening, left to right, (front row) John Carrato, winner of the University of Illinois Constituent Leadership Award; Tony Myers; Kathryn Mallon; Eduardo Aldana-Valdés; Richard A. Pattarozzi; (back row) Timothy E. Frank; and Robert A. Rodden.

Young Alumna Award

Timothy E. Frank  
(BS 02, MS 03)  
Assistant Professor of Civil and Environmental Engineering  

For accomplishments as an active duty officer in the U.S. Air Force completing civil engineering missions overseas; and for outstanding engineering achievements, leadership, and enhancement of engineering education as an engineering educator and researcher.

Robert A. Rodden, P.E.  
(BS 04, MS 06)  
Director of Technical Service and Product Development  
American Concrete Pavement Association  
Skokie, Ill.

For outstanding technical services to the concrete paving industry, leadership in applying new research findings and technologies especially through web-based communication interfaces, technology transfer activities and demonstrated entrepreneurial abilities.

Eduardo Aldana-Valdés  
(BS 57, MS 58)  
Professor of Industrial Engineering  
University of Los Andes  
Bogotá, Colombia

For innovative thinking and outstanding leadership in the development of the School of Engineering of the Universidad de los Andes, the SER Institute of Research, the Universidad de Ibagué and the Institute for Regional Innovation, and for contributions to the quality of life in Colombia.

Kathryn Mallon  
(BS 88)  
Deputy Commissioner  
New York City Department of Environmental Protection  
New York, NY

For excellence in managing the Capital Construction Program of New York City’s Department of Environmental Protection and the cost-effective delivery of New York City’s water and wastewater capital projects.

Tony Myers  
(MS 85)  
Vice President  
Global Water Technology  
CH2M HILL

For sound engineering practice and successful application of innovative technologies for improving public health in drinking water facilities across the United States and the world, and for sharing this knowledge in publications and presentations.

Distinguished Alumnus Award

Richard A. Pattarozzi  
(MS 66)  
Vice President  
Shell Oil Company  
Abita Springs, La.

For pioneering contributions in deep-water drilling activities in the Gulf of Mexico; for senior leadership at a global energy corporation; and for outstanding leadership in community and civic organizations.

cee.illinois.edu/alumni_awards_2013
In fall 2009, CEE at Illinois commemorated its largest-ever class of matriculating freshman women to date by inviting them to pose for a photo on the banks of Boneyard Creek (below). On Senior Sunday in May, they reunited for another photo in the same spot (above).

“What better way than this to show our time at the University of Illinois coming full circle?” wrote graduating senior Genevieve Nemeth, sixth from right in the first row above, who organized the second photo. “Though we don’t look much older, there is such a contrast between those first days on campus and now. Each one of us has accomplished a great deal in the past four years, and we have also grown together as a class. Freshman year when we took the same picture, I only knew the girl standing on my left. Now, I could tell you about an experience I had with almost every woman in my class. It’s exciting to realize how much we have achieved and that we have created ties with people who are going to make such an impact in the future.”

Professor David Lange, then associate head for undergraduate affairs, organized the first photo, extending the invitation to all 53 CEE freshman women. They represented an unprecedented 32 percent of total department freshmen. Forty-five of them graduated this spring.
CELEBRATING 50 YEARS

CEEAA Board Reaches a Milestone

The year 2013 marks the 50th anniversary of the Civil and Environmental Engineering Alumni Association Board. CEE at Illinois cordially invites you to return to campus for a celebration.

Please join us on:

**September 6, 2013**
50th Anniversary Alumni Reception

**September 7, 2013**
50th Anniversary Tailgate
Pre-Game Party followed by Illinois vs. Cincinnati football

For more information and to register, visit cee.illinois.edu/events