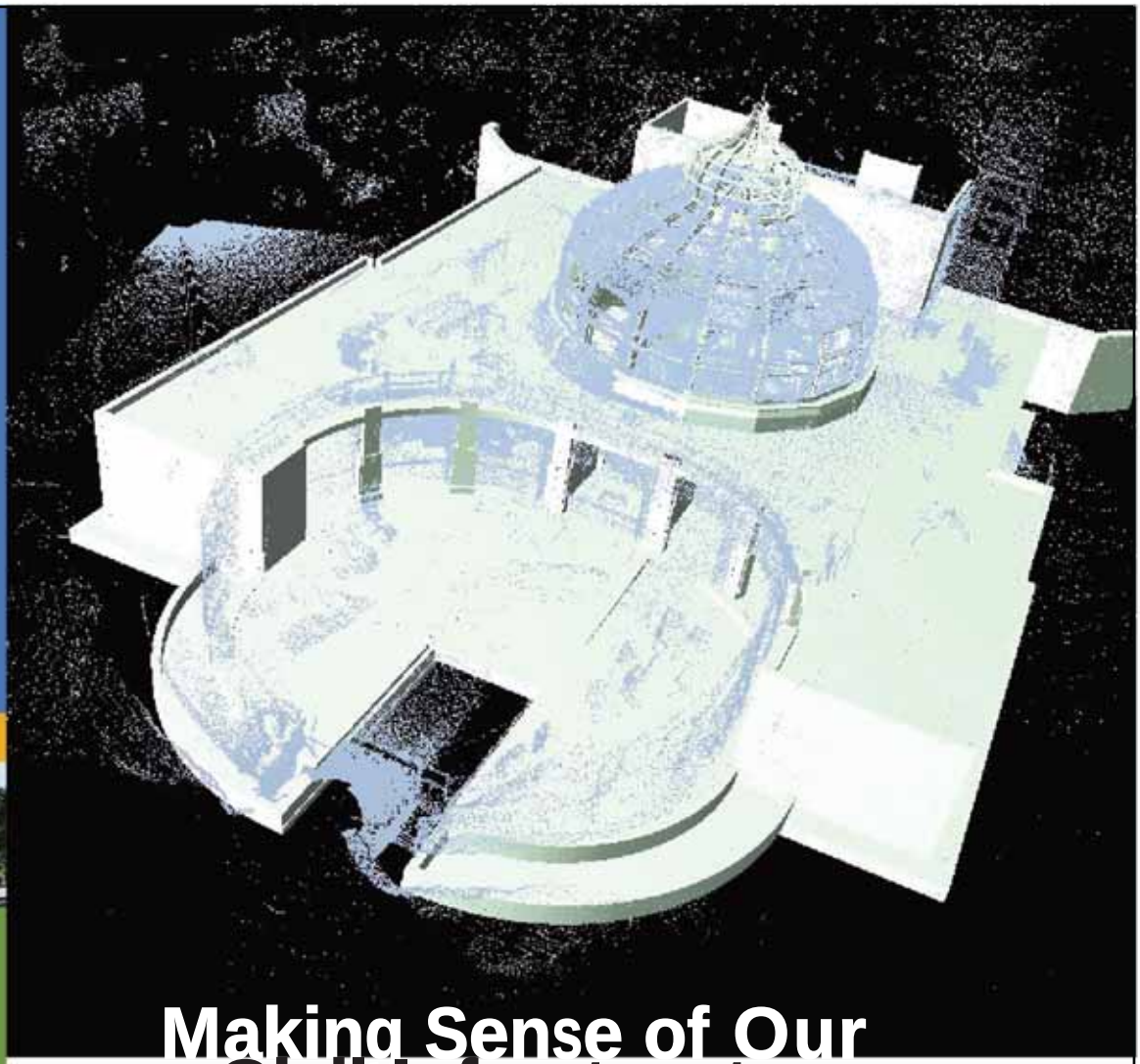
CMC

NEWSLETTER

SPRING & SUMMER 2007



Making Sense of Our Civil Infrastructure

Story Featured on Page 3

Also Inside This Issue....

CEE Alumni Blast!

See back cover for details

CEE Department Head

JIM GARRETT

Greetings from CEE! A tremendous amount of discussion at the local, regional and national levels has been taking place concerning what knowledge, abilities and skills we need to impart to our students to make them better able to compete in the global marketplace. To quote a member of the CEE Advisory Council at a recent meeting in CEE, "the US does not necessarily need more engineers, but what we need are for those we have to be more 'innovative' engineers." We in CEE are truly committed to educating and graduating engineers who are exceptionally innovative and effective problem solvers in a variety of technical disciplines and often spanning multiple disciplines. The flexibility of the CEE curriculum provides ample opportunities for our students to explore their multidisciplinary interests that often lead to innovations that were not obvious from a more restrictive single disciplinary perspective. To further enhance these abilities in our students, Dean Pradeep Khosla has launched an initiative to educate more formally our students in the creation and management of technical innovations. As part of this initiative, a new minor in Innovation, Entrepreneurship and Economic Development (IEE) is being offered by three colleges (CIT, H&SS and the Heinz School). We in CEE intend to engage fully in this initiative by: 1) encouraging our students to take the IEE minor as we advise them during their four years; 2) actively participating in the development of new courses that could be included in this minor; and 3) making sure that we continue to offer one of the most innovative, yet accredited, curricula in civil engineering in the US.

We have had a truly excellent year in CEE, as you will see in these pages. We have had a number of our faculty and students win national awards from the ASCE and other national organizations. Two new faculty were hired in the area of multiscale material modeling (Craig Maloney and Kaushik Dayal). Once again, we remained in the top 10 rankings for Graduate Programs for Environmental Engineering. As you have hopefully already seen, we have updated, or are in the process of updating, our CEE interfaces (web, newsletter, and facilities). We had a very successful graduate student recruitment season, with a number of the PhD students receiving Dean's Fellowships for their first year courtesy of Dean Khosla.

"We in CEE are truly committed to educating and graduating engineers who are exceptionally innovative and effective problem solvers in a variety of technical disciplines and often spanning multiple disciplines."

It is appropriate to thank all of you who help to make CEE successful. I would first like to thank those alumni who donate to the CEE Fund to help us to make student-related investments that make CEE a better place to learn and innovate. I thank those alumni who serve on our Advisory Council and provide valuable advice and assistance to me as I address the challenges of making an excellent department even better, who serve on the President's Advisory Board and provide an important and independent source of advice and assistance for improving the department, and who come to campus at various times during the year to give talks, to meet with the students for projects, to recruit them, and who mentor them as they move out into the professional world. We benefit from those alumni who promote us and our activities during their daily activity. The department is grateful to those corporations and other organizations who provide various forms of sponsorship for our departmental activities. Finally, I must recognize the faculty, staff and students in this department who work extremely hard to make CEE the excellent place that it is to work and learn. For all of these contributions, let me express my most sincere appreciation on behalf of CEE. Thanks!

Finally, on behalf of our entire department, I would like to express our heartfelt condolences to the friends and family of those persons lost on April 16, 2007 at Virginia Tech. The CEE Department there was particularly affected. Our CEE students planted a tree on our campus in honor of those students and faculty at a solemn ceremony on April 27, 2007.

FEATURED STORY

Making Sense of our Civil Infrastructure

The U.S. infrastructure is a trillion dollar investment, defined broadly to include road systems and bridges, water distribution and wastewater collection systems, water and wastewater treatment plants, power distribution systems, telecommunication network systems, commercial and industrial facilities, etc. Civil and Environmental Engineers play a major role in creation and management of our critical infrastructure. At Carnegie Mellon, our students learn that CEE researchers are at the forefront of a national movement to bring much greater use of sensing and information and communication technology to the construction and management of this infrastructure. We describe some of these research efforts in this article.

Figure 1: Sonar inspection image
Source: Redzone 2007, http://redzone.com/

Providing Situation Awareness on Construction Projects

Buildings and other types of built infrastructure, such as bridges, are getting more and more complex in terms of the geometries and integrated subsystems used, and as such have become more difficult to construct properly. Yet most of the time the engineers managing these projects rely on infrequent and spatially sparse data being collected using mostly manual methods in the field, such as transit-based surveying, to assess the as-built and as-is conditions of the construction project and to make decisions accordingly. Possessing a limited understanding of the 3D as-built conditions during construction can potentially result in missing deviations and construction defects that actually exist in projects. Similarly, limited understanding of the 3D as-is conditions that exist during the lifetime of infrastructure, such as a highway bridge, can result in not being able to assess adequately the conditions of the infrastructure effectively.

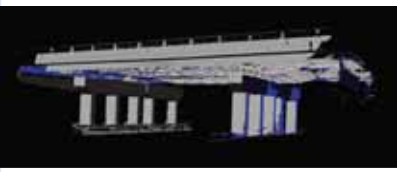


Figure 2. Laser scan of highway bridge

Professor Burcu Akinci and her colleagues and students are exploring a variety of sensing and tracking technologies, such as laser scanners and radio frequency identification (RFID) tags, that can help increase situation awareness. Laser scanners are able to capture millions of points on the surfaces of the infrastructure being constructed such that a very detailed survey of the three-dimensional geometry is captured (see Figure 2 and front cover). RFID tags are used to keep track of the location and the actions taken on high-value engineered systems being stored and installed on a construction site. Akinci and her team of researchers have been focusing on assessing the capabilities of such technologies in capturing the data needed by engineers. They have also been developing approaches to process automatically the data collected so as to help engineers by providing proactive quality control during construction and providing proactive identification of deterioration and damage during the life-cycle of these infrastructure systems.

Determining Site-Specific Seismic Design Loads

The increasing complexity of buildings, bridges and other lifelines requires that careful attention also be given to the design process, especially under the action of transient loads, such as those due to wind, man-made changes, and earthquakes. Since a knowledge of the predicted ground motion to which a structure will be subjected during its lifetime is a key first step for determining the seismic design loads, and the seismic ground motion at a site depends strongly on the in-situ material properties of soil deposits and the deeper geological structure, it is essential to be able to characterize accurately the material profiles of spatially heterogeneous individual sites and complex basins alike. Professor Jacobo Bielak and his colleagues and students are integrating recently developed powerful inversion techniques with earthquake records and data from in-situ tests to perform high-fidelity site and basin characterization. They have already verified their inversion algorithms with

Story continued on page 4

Making Sense of our Civil Infrastructure

pseudo-data from earthquake simulations on cross-sections of the Los Angeles basin derived from the SCEC Southern California Velocity model, as shown in Figure 4, which depicts a prior model (left) used as an initial guess, along with the converged model (middle). The converged model is able to reproduce even fine features of the target model (right). To begin implementing this methodology in practice, they plan to conduct field tests this fall in a small valley in California, with support of a grant from the NEES program of NSF, using a large field shaker from the University of Texas, called Liquidator, to generate seismic motion that will be recorded by a large number of sensors (geophones) both on the free surface and inside boreholes. They will also be recording earthquake ground motion from small earthquakes with sensors (accelerometers) of the USArray component of Earthscope to augment the dataset from the field tests. This is a four-year project that, if successful, stands to revolutionize the way site characterization is performed, by removing many of the limitations inherent to current in-situ seismic inversion approaches, and by offering, for the first time, systematic tools for performing full three-dimensional site characterization.

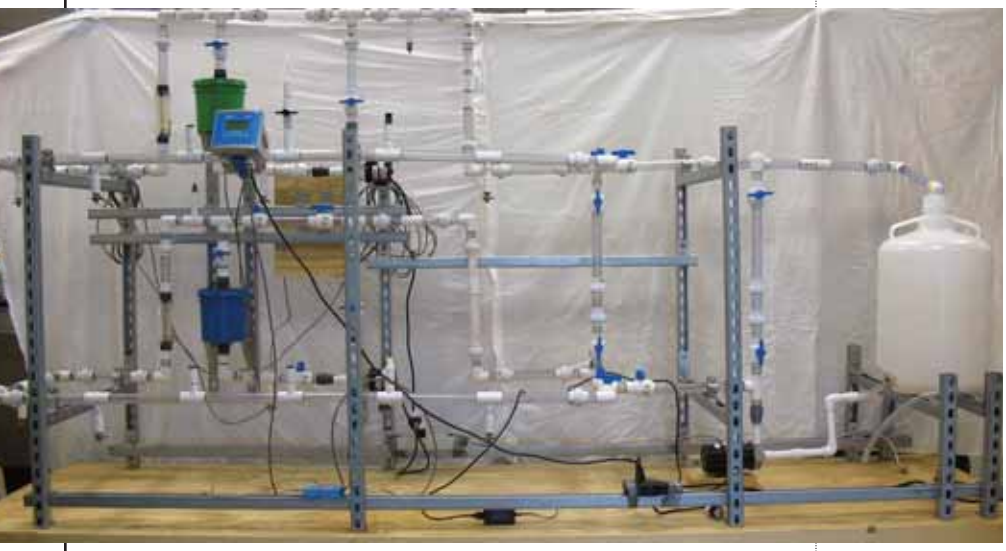


Figure 3. Model Water Distribution System

Monitoring our Drinking water Distribution Systems

Drinking water distribution systems are another type of critical infrastructure, necessary for protecting human health and economic development. However, they are monitored using simple methods including grab samples (i.e., samples taken from the system at various locations) and pressure and flow gauges. Real-time water quality monitoring for disinfectant residual (chlorine) or specific pathogens or chemical contaminants is in the development stage (see Figure 3). Use of these sensors to manage and control the system as well as to detect intentional attacks requires careful attention to the placement of the sensors as well as an understanding of the variability and inherent uncertainties in the data they will return. Professor Jeanne VanBriesen and her colleagues and students, members of the Center for Water Quality in Urban Environmental Systems (Water QUEST), are focusing on optimized placement and data interpretation of sensors within drinking water distribution systems. They are exploring methods to use the data for real-time system control and more precise disinfectant dosing. Further, they are investigating methods to identify problems in the system that might result from operational errors, infrastructure failures, or intentional system attack. They envision an intelligent infrastructure that links sensors in the water distribution system with a data store and a model of the system to enable detection of anomalous system behavior and enhanced decision making to solve system problems.

Monitoring our Sewer Systems

Another type of infrastructure being studied in the department is the wastewater collection system. The inspection and condition assessment of sewer pipelines has been impacted by two complementary but at present unintegrated developments. The first development, driven by EPA and state consent decrees, is an unprecedented increase in the use of closed-circuit television (CCTV) and the storage and mapping of this data in a geographical information system. This first development alone creates a rich dataset to be analyzed and an opportunity to improve decision support by using and developing spatial data analysis tools. The second development is the emergence of alternative and complementary technologies for sewer inspection that overcome some of the limitations of the CCTV technology (see Figure 1 for one such example based on sonar-based sensing). These alternative technologies allow measurements of deformation in the pipeline section and quantification of deposits. Professor Lucio Soibelman and his colleagues and students are attempting to create a framework that can harness these two developments, i.e. traditional inspection technology data and new technology development. This framework is intended to define the role, limitations, potential and means of integrating these inspections technologies, and provide guidelines for acquiring, storing, managing and analyzing these data. In addition to creating the framework, Soibelman in collaboration with Professor Jim Garrett and their students are exploring,

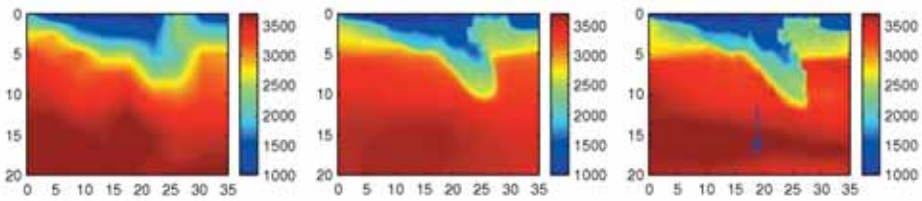


Figure 4. Stages of a seismic inversion, starting from a prior model (left). The target model is on the right and the converged model in the middle; scale represents shear wave velocity in m/s

with support from RedZone Robotics, a means to automatically detect defects/anomalies and/or critical features using visual data acquired from sewer pipeline infrastructure inspection and condition assessment process.

Monitoring our Oil and Gas Pipelines

With the ever expanding network of pipelines supporting the distribution of oil and natural gas in the US, there has been increasing demand for their continuous monitoring to support maintenance activities and for making intelligent decisions about these oil and natural gas distribution infrastructures. Professors Soibelman and Garrett with Adjunct Professor Hoon Sohn, are performing an in-depth theoretical and experimental study of the wave propagation in hollow cylinders actuated using innovative Macro Fiber Composite (MFC) transducers. This approach would then provide the basis to apply state-of-the-art damage detection techniques developed and tested successfully on plate-like structures. The basic idea is that these patches act as both actuators and sensors and are able to pass the sent signals back and forth to each other so as to determine where local damage exists that disturbs the transmitted signal.

Developing New Sensors

Professor Irving Oppenheim, in collaboration with Professor David Greve from Electrical and Computer Engineering (ECE), has developed new sensors, including MEMS (microelectromechanical systems) devices, for civil infrastructure applications. Acoustic emission sensing is used to detect flaws or fatigue cracks in steel structures, and in a collaborative project with Professor Stephen Pessiki at Lehigh University the research team has developed four different MEMS devices to function as acoustic emission sensors. Their newest four-channel MEMS device, with its amplifiers, is housed in a 25x25x15 mm volume (see Figure 5) and is scheduled for testing on a railroad bridge in May or June 2007. In collaboration with Adjunct Professor Hoon Sohn, and Professor Patrick Yue from ECE, an active transducer was developed for Lamb waves in steel plate structures, generating ultrasonic waves and then recording the echoes from boundaries and from flaws. The project was a major breakthrough, because the transducer mounted on the steel structure is totally passive (no wires, no batteries) and is powered by inductive coupling with a probe coil. This technology has been demonstrated on a steel plate girder in the CEE laboratories, and has been extended to full-size steel box girders. Oppenheim's research team has also developed an integrated circuit microsensor to measure chloride concentration. The sensor was first intended for use in monitoring chloride concentrations in concrete, but the technology is now envisioned to have considerable potential for sensing residual chlorine in drinking water systems, which is being studied in collaboration with Jeanne VanBriesen. The sensor developments in Oppenheim's research group have led to collaborations with many industry participants including Bombardier, Bosch, Physical Acoustics Corporation, TISEC, and WavesInSolids.

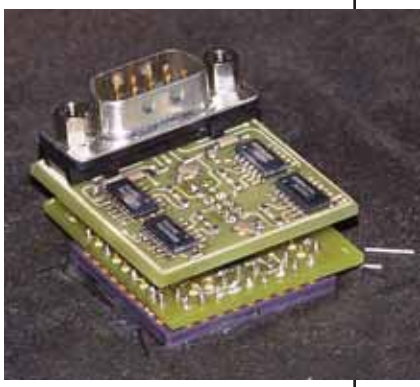


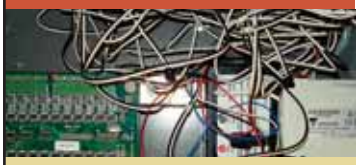
Figure 5. CMU four-channel MEMS system, 25x25x15 mm, 2007

The future of infrastructure systems will include significantly more information—generated during construction and operation and managed by intelligent control systems as well as human engineers and operators. Much more condition and usage data will be automatically and continuously collected, processed and converted into useful information about our infrastructure systems. This information will inform our decisions, from prioritization or repair and replacement to rapid response in the event of an intentional attack on these systems.

Several centers with significant CEE leadership and involvement are performing research in this area: WaterQUEST (previously mentioned) and CenSCIR, the Center for Sensed Critical Infrastructure Research, co-directed by Professor Jim Garrett and Professor Jose Moura from ECE.

Civil and environmental engineers are at the forefront of developing and evaluating the new technologies necessary to create this "sensed" infrastructure. At Carnegie Mellon, we are focused on identifying the roadblocks to implementation and on training the next generation of engineers to design and manage the intelligent infrastructure of the future.

CEE NEWS



A Tour of CEE

From the Class of 2007's Perspective

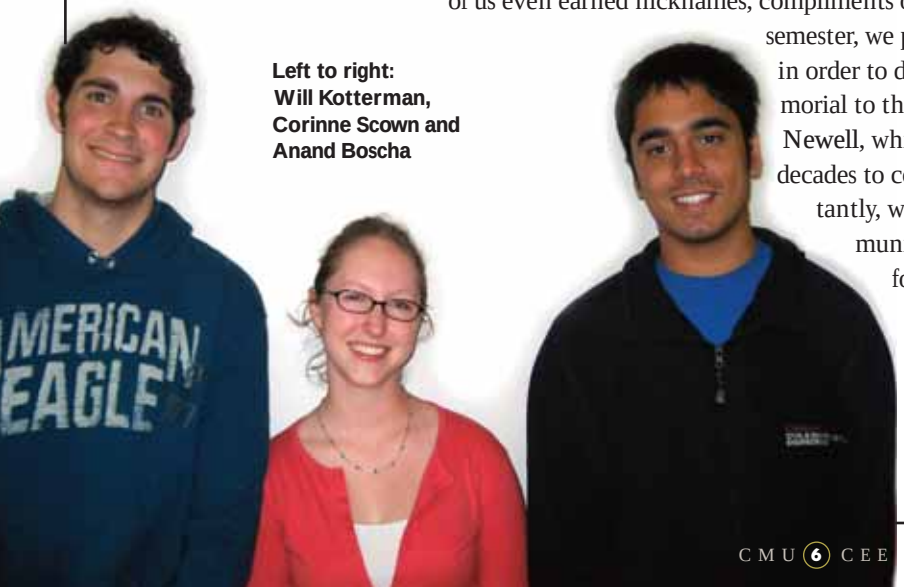
Whether you are an undergrad, grad student, alumni, faculty, or staff member, we realize that you probably know your way around the department by now. For this article, however, humor us as we take you on a tour from the Class of 2007's perspective. We will start at the entrance to the Tung Au Lab. Directly to the left is Professor Oppenheim's office. For many of us, he provided our first introduction to civil and environmental engineering by strapping on his rock climbing gear and really putting our cardboard bridges to the test. A number of us went on to TA for his class and to this day, we are still surprised by the outcomes.

If you venture in a bit farther, you will see the CEE Undergrad Cluster. That is where we spent countless hours struggling with Maple and Mathcad, working on fluids problems, designing our concrete canoe, and perfecting the art of Photoshopping Professor Larry Cartwright into "Lord of the Rings" posters. We also knew that if it was 3:00am and we still didn't understand the computer applications problems, Professor Susan Finger was still in her office right down the hall to help us out. The cluster has always been a place where we could work together on projects, do homework, or just socialize. There, we also got to know the students in the classes ahead and behind us, making friendships that will last long after we have left CMU.

The next stop is Larry's office. It was there that we squirmed through the soils lab oral exam or ran in at 4:59 PM on Fridays to turn in our lab write-ups. Across the hall is the solids lab, where we watched wood and metal specimens fail, or pondered the seemingly impossible stress/strain problem. That leads us to Tung Au Lab itself. We started by taking turbidity readings and calculating settling rates for Intro to Environmental Engineering. Along the way, we heard stories that most of us will probably never forget and learned concepts through real-world applications.

We fretted over senior design projects and got a strong dose of humility from Professor Fran McMichael, who reminded us that we don't know everything…yet. We learned that the best way to launch a wooden bridge across a river was not by raft. We earned the hardhats that will make us stand out at graduation, and some of us even earned nicknames, compliments of Larry. In our final semester, we put our hardhats to use in order to design and build a memorial to the late Professor Allen Newell, which will last for decades to come. But, most importantly, we built a sense of community. Thanks for a great four years.

Sincerely,
Anand Boscha,
Corinne Scown,
and Will Kotterman



Left to right: Will Kotterman, Corinne Scown and Anand Boscha

CEE Spring Semester Visitors

James Schauer, Associate Professor in Civil and Environmental Engineering at the University of Wisconsin-Madison, visited CEE on March 30th and gave a seminar on atmospheric mercury. Mercury is a potent neurotoxin emitted by coal plants, municipal waste incinerators and other sources, transported in the atmosphere, deposited to ecosystems, bioaccumulates in fish, which are then eaten by humans. Prof. Schauer showed the results of atmospheric measurements made by his research group as evidence that there are more local mercury "hot spots" than are apparent from the national Mercury Deposition Network.

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Thomas H. Jordan, University Professor and William M. Keck Foundation Chair at the University of Southern California, and Director of the Southern California Earthquake Center (SCEC), was the speaker at a department seminar on March 23rd, co-sponsored by the Department of Computer Science and the Pittsburgh Supercomputing Center. Jordan, a world-renowned authority in earth science, discussed "Some Computational Problems in Earthquake System Science." **Professor Jacobo Bielak** and his colleague **Professor David O'Hallaron**, from the Departments of Computer Science and Electrical and Computing Engineering, have been involved with SCEC on this effort for over ten years.

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Chimay Anumba, Professor of Construction Engineering and Informatics and Director for Centre for Innovative and Collaborative Engineering (CICE) at Loughborough University in Leicestershire, UK, visited CEE on April 27 to give a seminar entitled, "European Research Trends in Construction Engineering and Informatics". Dr. Anumba spoke about the European Union's (EU) Seventh Framework Programme for research and technological development, and how it is designed as a key contribution to the EU's strategy for growth and jobs.

AIS Project Measures Electricity Consumption in CEE and on Campus

Many academic institutions including CMU lack a proper control of energy consumption and utilization. This has resulted in high energy costs and degradation of the environment and natural resources. To help achieve one aspect of environmental sustainability, it is important for us to have a better control and understanding of the long term impact of daily energy usage. Currently, Facilities Management Services (FMS) has no measure of how the university consumes electricity at a departmental level. The goal of the 2007 AIS Masters project was to create a data acquisition system to monitor the amount of electricity consumed by the CEE Department in Porter Hall. The end result of the project is a sensor network that can be reproduced for other buildings and departments. In addition to the sensor system, a data management system was created to organize the data collected and present it in a usable form. The system provides real-time interaction with end-users by monitoring and analyzing electricity consumption of the CEE department and displaying the information on a flat-screen located in the CEE Alumni Lounge, as well as in individual desktop mini-applications for each office space. It is the hope of the team that this initiative will further encourage a decrease in energy consumption by spreading public awareness and promoting consciousness about energy usage.

The student members of the team (pictured above) are: **Ziqi Chen, Mario Berges, Michael Franzonello, Akhilesh Gupta, Dacia Young** and **Debaditya Dutta**. Previous participants include: **Berkay Baykal, Tyrone Chiu, Hsuan-Tung Chu, Ran Li,** and **Utkan Ozcan. Professors Scott Matthews** and **Lucio Soibelman** have led the course with help from Facilities Management Services (FMS) personnel Brad Hochberg and Joe Stubler.

New Course in CEE: International Collaborative Construction Management (ICCM)

CEE launched a new course this spring, called the ICCM course, that is intended to prepare civil engineers to work in a global environment. Led by **Professors Burcu Akinci** and **Lucio Soibelman**, the course had students connected and interacting through video conferencing and other collaboration tools as they confronted construction project-management-related challenges in international construction contexts. The U.S.-enrolled students developed bids and building specs for three separate international projects along with student teams in Brazil, Turkey and Israel. The student teams were supported by faculty and industry mentors in all four countries.

CEE Faculty Ranked Fifth in Nation by Scholarly Productivity Index

According to the 2005 Faculty Scholarly Productivity Index, Carnegie Mellon faculty rank first in the country in the discipline of cognitive science, third in information science, fourth in computer engineering, fifth in civil and environmental engineering, sixth in computer science, seventh in linguistics and statistics, and ninth in applied mathematics. Carnegie Mellon ranked sixth overall among large research universities.

Produced by Academic Analytics, the index rates the productivity of faculty at more than 7,000 doctoral programs in the nation according to the number of published books and journal articles, journal citations, awards, honors, and grants received. Academic Analytics, founded in 2005 by faculty and researchers at Stony Brook University and Educational Directories Unlimited Inc., provides data collection and reporting for the higher education industry. To access the index, visit http://www.academicanalytics.com/.

Students Benefit from Fenves Travel Grant

CEE graduate students **Troy Hawkins, Sang Jun Lee, Shahzeen Attari, Shannon Isovitsch**, and **Raghav Narayanan** were awarded a 2006-07 Fenves Travel Grants. This program was established in honor of Emeritus Professor Steven J. Fenves to provide partial conference funding support to graduate students who will be traveling to a professional conference. The partial funding provided enabled Hawkins to attend the Gordon Research Conference in Oxford, UK; Lee to attend the 2006 ASME International Mechanical Engineering Congress and Exposition in Chicago, Illinois; and Attari to attend the Sustainable Consumption Research Exchange Conference in Wuppertal, Germany. Isovitsch attended the World Environmental & Water Resources Congress in Tampa, Florida in spring 2007 and Narayanan will be traveling to the International Water Association 2007 Specialist Conference in Moncton, New Brunswick, Canada in June.

CEE NEWS 2007

FRONTIER RESEARCH

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Workshop on Frontier Research Directions and International Collaborations in Sustainability Engineering

The Workshop on Frontier Research Directions and International Collaborations in Sustainability Engineering was held near Auckland, New Zealand on February 24, 2007. Supported by the US National Science Foundation and organized jointly with the International Centre for Sustainability Engineering and Research (ICSER, University of Auckland, New Zealand), the workshop brought together 28 US professionals and 38 international participants. Professor Chris Hendrickson was the organizer of the workshop, with Carnegie Mellon participants including Cliff Davidson, Mike Griffin, Deanna Matthews, Scott Matthews, and Heather Wakeley plus alumni Jackie Isaacs, Jim Mihelcic and Annie Pearce. The workshop provided numerous valuable insights for sustainability engineering and an unusual opportunity for international interaction. Some summary observations follow.

Importance of Sustainability Engineering

There is widespread social and political interest in the topic of sustainability. For example, shortly before the workshop, the New Zealand government had set ambitious goals for reduced emissions of pollutants associated with global climate change. While there is widespread interest in promoting sustainability, there are very different concepts about the policy changes needed to achieve significant movement towards sustainability. There is also considerable scientific ignorance and uncertainty about sustainable technologies, impacts of human activities on natural systems, and the various trade-offs associated with different policies and technologies. Moreover, many participants emphasized the need for sustainability education for students, practitioners, policy makers and the general public.

Potential Research Topics

Better understanding of the limits of natural systems and the interaction of industrial emissions with the natural environment is a critical need. Risks and vulnerabilities are also important research areas to understand the deleterious effects that policies and decisions made in isolation might have on an entire region. Expanding engineering research to include economic, environmental, and societal goals provides opportunities for useful collaboration with social scientists and other professionals.

Potential International Collaborations

There are clearly different rates of scientific progress and experience around the world. As a result, international collaborations are valuable and welcome. While the workshop focused upon potential Pacific collaborations, similar opportunities exist for other areas of the world.

International Workshop on Computing In Civil Engineering to be held on July 25-27, 2007

The ASCE International Workshop on Computing in Civil Engineering will be held on Carnegie Mellon's campus this July. The conference will highlight: IT/AIS - Information Technology Support to Advance Infrastructure Systems Management . The conference will also hold a tribute to **CEE Emeritus Professor Steven J. Fenves**, with special sessions and dinner on July 26 with Fenves as the guest of honor. For more information, please visit: http://www.ce.cmu.edu/~asce2007.

Please Join Us for the CEE Alumni Blast ~ July 28, 2007

Alumni, please have your family join the CEE family for a morning of reacquainting yourself to the department and university and an afternoon of barbeque, games and fun. Fun projects for the children during the morning too! To RSVP and for more info: please email Patty Langer at **patty@andrew.cmu.edu** or call at 412-268-1070.

Peter Adams Receives EPA Grant

Professor Peter Adams has been awarded a research grant from the EPA to investigate how global-scale air pollution and global climate change impact US air quality. EPA is providing support to build integrated models that simulate air pollution from the global to local scales. The effort, in which Prof. Spyros Pandis (ChemE) is a co-investigator, builds upon an earlier collaboration between the two CMU faculty. Both professors are members of CMU's Center for Atmospheric Particle Studies (CAPS).

CEE DONORS *June 2006 – May 2007*

The Department of Civil and Environmental Engineering personally thanks the following donors for their contribution to the department. Their generosity is important to us and greatly appreciated.

During this past year, contributions to Civil and Environmental Engineering helped students travel to local, regional and national conferences. They provided instructional supplies for our project courses, defrayed the cost of hosting high-quality speakers, and provided some seed funding for faculty research projects that could result in substantial grants from external funding agencies. We have also used some of these funds to help improve our facilities, such as the creation of collaboration facility to support an International Construction Management course taught this spring involving students and faculty from four different countries, and the upgrade of the 118 wing for graduate students.

Our commitment continues to be to provide an outstanding education for young men and women in Civil and Environmental Engineering within the best educational and research environmental we can provide. We truly appreciate the support and vote of confidence in our department that this support represents. We thank the donors again for their generous contribution.

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Mr. Richard Feder
Mr. Richard Ford
Ms. Sara Frailey
Mrs. Andrea Francioni Rooney
Mr. Francis Fruehstorfer
Mr. John Furjanic
Ms. Lourdes Garcia-Calderon
Mr. Christopher Garvin
Mr. Michael Gegenheimer
Mr. Arthur Gehron
Ms. Alexa Geigerich
Ms. Sara Gerrick
Dr. Daniel Giammar
Mr. Glenn Gilbert
Mr. William Gilman
Mr. Robert Goldberg & Mrs. Lynn Levyn Goldberg
Mr. Eric Gonzales
Dr. John Gormley
Mr. Marshall Gorr
Mr. John F. Graham, Jr.
Ms. Roxanne Grebey
Mr. Charles Grimm
Mr. John Gyurina
Mr. Robert Hackett
Mr. David Hagopian
Ms. Tammi Halapin
Dr. Marc Halpern
Ms. Rita Heckrotte
Mr. Richard Heilman
Dr. L. R. Hettche
Mr. Frederick Hill
Mr. George Hinson
Mr. Thomas Hodge
Mr. James Hoey
Mr. Joseph Honse
Mr. Richard Horbiak
Mr. Boyd Howard
Mr. Paul Hrynko
Mr. David Hughes
Ms. Patricia Hughes
Dr. Alan Husak
Mr. Douglas Hunter
Mr. Jonathan Hutchinson & Mrs. Christine Hutchinson
Mr. Matthew Iannuzzi
Mr. Mario Iasella
Mr. Michael Ingram
Mr. Johan Jackson
Mr. Robert Jacobs
Mr. Richard Jacobson
Mr. Deepak Jain
Mr. Brian Joos
Mr. James Jurkovec
Mr. Michael Kahrs
Dr. Sandra Karcher
Ms. Anne Karolyi
Mr. Navroz Karkaria
Mr. William Keck
Mr. Robert Kehoe
Mr. Roger Keilig
Mr. Ronald Kelsey
Mr. George Kemp, Jr.
Mr. William Kind
Mr. John King
Mr. Randolph Kirk
Mr. Drake Klotzman
Mr. William Kotterman
Mr. John William Kovacs
Mr. Rodney Koza
Mr. Saul Kravitz & Mrs. Beryl Kravitz
Mr. Walter Kritzky, Jr.
Mr. Alex Krokowski
Mr. Robert Kromer
Mr. Edward Kuenzig
Mr. Neal Kushner
Ms. Valerie Lahti
Mr. Douglas Lambert
Mr. James A. Langer
Mrs. Galina Leiphart
Mr. Donald Lessig
Mr. Stanley Lewandowski
Mr. Daniel Lewis
Mr. James Lord,
Mr. George Lynch
Mr. Stanton Lyons, Jr.
Mr. Michael Malone
Mr. Michael Mancina
Mr. James Mandel
Mr. Kenneth Mann
Ms. Donna Marano
Ms. Roberta Marstellar
Mr. Dominic Masciantonio
Ms. Chelsea May
Mr. Daniel McGaffin
Dr. Sue McNeil
Mr. William Merchant
Ms. Adrienne Michelle Messenger
Dr. Keith Meyer
Mr. Carl Miller
Mr. Gerald Miller
Mr. John Vinton Miller, Jr.
Dr. James B. Miller & Mrs. Janel M. Miller
Ms. Luzmaria Monasi
Ms. Marissa Mori
Ms. Mary Morrow
Mr. Richard Morrow & Mrs. Margaret Morrow
Mr. Dexter Charles Murphy
Dr. Roseanna Neupauer
Mr. Nicholas Nichols
Mr. Leo Noker
Mr. William Nuzzo
Mr. Kevin O'Brien
Dr. Paul Ossenbruggen
Mr. Timothy Ottie
Mr. Stanton Over
Mr. Joseph Pajer
Ms. Irene Pantelaros
Dr. Christopher Papadopoulos
Mr. Kenneth Boscha and
Dr. Rita Patel
Mr. Robert Patterson
Mr. George Pavlovich
Mr. Seth L. Pearlman
Ms. Linda Perry
Ms. Joan Peterson
Dr. Raman Pichumani
Mr. Mark Pleskow
Mr. Frank Polma
Ms. Diann Maree Porto
Mr. Mark Powder
Mr. Richard Daniel Quinn, IV
Mr. Thomas Rau
Mr. Louis Raymond
Mr. Christopher Reiling
Mr. Michael Repasky
Mr. Dominic Rinaldi
Mr. John Ritter
Ms. Lynn Ritter Otte
Mr. Edward Robertson, Jr.
Mr. Stephen Robuck
Ms. Marsha Rogers
Mr. Dareen Romanchik
Mr. Douglas Rowe
Mr. Jerome Roy
Dr. Sujoy Roy
Mr. Richard Russell
Ms. Ellen Sable & Dr. David LaPotin
Mr. Douglas Sackin
Dr. Tariq Samad
Ms. Carla Santoro
Mr. Stephen Sawyer
Mr. Kenneth Scheppele
Mr. Eric Schmidt
Mr. Trevor Schmidt
Ms. Sara Schultzer
Ms. Corinne Scown
Mr. Joseph Sczurko
Mr. Walter Seigfried
Mr. Joel Shodi
Mr. Scott Sibley
Dr. Jack Silberman
Mr. Taylor Simmons
Mr. Peter Simon
Mr. Yet Siu
Mr. Michael Slenska
Mr. Lawrence Smedley
Dr. Kim Smith
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Mr. Daniel Smyers
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Ms. Laura Sperduto
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Ms. Nancy Williams
Mr. Gilbert Williamson
Mr. John Wilson, Jr.
Mr. Joseph Wilson, Jr.
Ms. Iris Winstanley
Mr. John Wise
Ms. Laurie Worthington & Mr. Hadrian Rori
Dr. Jifeng Xu
Mr. John Yadlosky
Ms. Cindy Yang
Ms. Elizabeth Yarsky
Mr. Douglas Zaenger
Mr. Todd Zeisler
Dr. Fang Zhao

FACULTY 2007

DZOMBAK & AKINCI NEW FACULTY AWARDS

Dave Dzombak Appointed Walter J. Blenko, Sr. Professor of Environmental Engineering

Carnegie Mellon University's David A. Dzombak was named the Walter J. Blenko Sr. Professor of Environmental Engineering for his outstanding accomplishments in civil and environmental engineering, effective March 1.

"Dave has contributed to raising the national visibility and impact of our environmental engineering education and research, and the Blenko professorship recognizes his significant contributions to and leadership of the environmental engineering program in our top-ranked Department of Civil and Environmental Engineering (CEE). His contributions will enable this program to rise to even higher levels," said Pradeep Khosla, dean of Carnegie Mellon's College of Engineering.

For more than two decades, Dzombak has conducted leading-edge research in the areas of aquatic chemistry, water and wastewater treatment, abandoned mine drainage remediation, river and watershed restoration, and hazardous waste site remediation.

The Walter Blenko Sr. Professorship, established in 1981, is funded by Walter Blenko Jr. and his wife, Joy. Walter Jr. received his mechanical engineering degree from Carnegie Mellon in 1950. A lawyer at Eckert Seamans Cherin & Mellott in Pittsburgh, Walter Jr. established the Walter Blenko Sr. Professorship in Civil and Environmental Engineering in memory of his father, who was a mechanical engineering graduate and a life trustee of the university.

"I am honored to be recognized with the Blenko chair, and I will use the visibility and resources of the chair to advance the mission of the Civil and Environmental Engineering Department, the College of Engineering and Carnegie Mellon," said Dzombak, who is associate dean for graduate and faculty affairs in the College of Engineering and co-director of the new Center for Water Quality in Urban Environmental Systems (WaterQUEST). "The environmental engineering research and education program is world-class, driven by outstanding, highly motivated faculty, students and staff. I am fortunate to be a part of this innovative group."

"We are extremely proud of Dave's accomplishments, and this professorship recognizes those outstanding accomplishments and his promise here at Carnegie Mellon," said James H. Garrett Jr., professor and head of the Department of Civil and Environmental Engineering.

Burcu Akinci Honored by Engineering Society for Outstanding Research

Carnegie Mellon University's Burcu Akinci has been selected to receive the prestigious 2007 Walter L. Huber Civil Engineering Research Prize from the American Society of Civil Engineers (ASCE). The prize is awarded to ASCE members under the age of 40 in honor of their notable research achievements in civil engineering. Akinci, an associate professor of civil and environmental engineering, will receive her award at the ASCE national meeting, Nov. 1–3 in Orlando, Fla.

"I am delighted to receive this award because it is a recognition from my peers for my research. I am very pleased to be doing research that contributes to and enables civil engineers to take advantage of today's ever-changing world of technological innovation," said Akinci, one of five award recipients nationwide this year.

"We are very pleased that Burcu received this outstanding national recognition because she is so deserving of this honor," said James H. Garrett Jr., head of Carnegie Mellon's Department of Civil and Environmental Engineering. "Burcu is a stellar, innovative and very hardworking researcher who greatly contributes to the international technical knowledge base, and in doing so significantly adds to the reputation of this department."

Akinci's seminal work focuses on leveraging building information models and a variety of sensors to streamline construction and facility-management practices.

New Faculty Members!

CEE is very pleased to announce the addition of two new faculty members:

Kaushik Dayal received his PhD at Caltech in 2006 in Mechanical Engineering on the topic of "Nonlocal microstructural mechanics of active materials". Kaushik has interests in computational modeling of unusual material phenomena, such as superelasticity or shape memory in certain metallic alloys or optical-mechanical-electric coupling in ferroelectrics, that are driven by structural phase transitions. Kaushik is currently in a post-doctoral position at the University of Minnesota studying the instabilities of biophysical systems and nanostructures, and will join us after he completes his post-doctoral studies in January 2008.

Craig Maloney received his PhD in Physics in 2005 from the University of California at Santa Barbara on the topic of "Amorphous Systems in Athermal Quasistatic Shear." His research interests are in computational modeling of the dynamics of disordered systems on a wide range of scales: 1) those systems disordered at a molecular level, such as liquids and gases composed of silicates, polymers and metal alloys; 2) those systems disordered at a meso-scale level, such as emulsions and colloids; and 3) those systems disordered at a macroscopic scale, such as granular materials and foams. Craig is currently in a post-doctoral position at Johns Hopkins with Mark Robbins studying the formation and evolution of fault systems. Craig will join us this coming fall.

Jeanne VanBriesen to Receive Award from PWEA

Professor Jeanne VanBriesen, co-Director (with Dave Dzombak) of WaterQUEST, recently won the 2007 Professional Research Award from the Pennsylvania Water Environment Association (PWEA). The award honors outstanding research in support of the PWEA mission, which is focused on municipal and industrial wastewater treatment and stormwater management. Jeanne will receive the award at PWEA annual conference at State College in June. *Congratulations Jeanne!*

Greg Lowry and Yuenqiang Liu have 15th Most Cited Paper in ES&T in 2005

Professor Greg Lowry and recent **Ph.D. Graduate Yuenqiang Liu** wrote the 15th most cited paper published in Environmental Science & Technology journal in 2005. With over 1200 published papers in 2005, being cited so frequently in the most prestigious and influential environmental journal will have an impact on future environmental research in this discipline. This paper determined the fundamental physical and chemical properties of two different types of reactive nanoscale zero-valent iron particles used for in situ groundwater remediation.

The fundamental knowledge gained about which particle properties influenced their reactivity and longevity in aqueous systems enables selection of the optimal nanoiron type for optimal remediation, and enables the optimization of the synthesis method to provide nanoiron with the desired properties.

Jim Garrett Receives CIT and ASCE Award

CEE Professor and Head Jim Garrett was presented the CIT Steven J. Fenves Award at the Faculty Awards Banquet in April. The Steven J. Fenves Award, presented to a faculty member in CIT, acknowledges significant contribution to systems research in areas relevant to the Institute for Complex Engineered Systems. Garrett is also the co-Director (with Jose' Moura from ECE) of the ICES-based Center for Sensed Critical Infrastructure Research (CenSCIR).

Also Jim Garrett was named the ASCE Pittsburgh Section Professor of the Year for 2007. He accepted the award at a dinner at the Engineer's Society of Western PA on February 17. *Congratulations Jim!*

Chris Hendrickson Elected Honorary Member of ASCE

Professor Chris Hendrickson was recently elected to the grade of Honorary Member of the American Society of Civil Engineers. An Honorary Membership is only given to a person who shall have attained acknowledged eminence in some branch of engineering or in the arts and sciences related there to Civil Engineering. Chris joins 555 other engineers in the 155-year history of ASCE to receive similar honors. *Congratulations, Chris!*

Professor Dave Dzombak was recently appointed as Director of the Steinbrenner Institute for Environmental Education and Research (SEER). SEER's charter is to increase Carnegie Mellon's visibility and impact in environmental research and education through seeding, developing, and enhancing collaborative projects across the campus. SEER has allocated more than $300,000 in grants to a variety of research and educational initiatives, including industry panel sessions, media boot camps and fellowships across campus. Professor Dzombak succeeds Professor Chris Hendrickson, who served as the founding Director of SEER.

STUDENTS 2007

BAKER CORP.

ASCE WORKSHOP

AWMA AWARD

CEE Students Visit Michael Baker Corporation

The Annual Michael Baker Jr. graduate fellowship luncheon was held on March 2, 2007 at Michael Baker Corporation headquarters at Moon Township, PA. The recipients of the 2006-2007 Baker fellowship are Micah L Brill and Jin Hwan Oh. Joining the Baker fellows was Laura Seitz, who won

the AICUP Michael Baker Diversity in Engineering Scholarship last year. Laura is doing a double major in Civil and Environmental Engineering and Engineering and Public Policy. Pictured above are David Higie, Larry Diday, Jin Hwan Oh, Micah Brill, Laura Seitz, Chris Ruppen, Patty Anderson, Jackie Riggins, and Josh Schidlmeier.

CEE Student Wins ASCE Award

CEE undergrad Will Kotterman won the ASCE Pittsburgh Section Student Award Foundation Achievement Award. The award is presented to an engineering student who maintains excellent academic standing, participates in extracurricular activities and community service. The ASCE Pittsburgh Section gave the award at an awards banquet dinner held at the Engineer's Society of Western PA on February 17. *Congratulations Will!*

Best Student Paper Finalists at SuperComputing 2006 (SC06)

The paper *"From Mesh Generation to Scientific Visualization: An End-to-End Approach to Parallel Supercomputing,"* by a team of researchers from Carnegie Mellon University (**Tiankai Tu, Leonardo Ramirez-Guzman, Jacobo Bielak and David R. O'Hallaron**), the University of California at Davis (Hongfeng Yu, Kwan-Liu Ma) and the University of Texas at Austin (Omar Ghattas), was a finalist for the Best Student Paper competition at SC06.

CEE Students Named ACS Scholars

Congratulations to **Corinne Scown** and **Will Kotterman** for being named Andrew Carnegie Society Scholars for 2007. Each ACS Scholar is given a $1,500 award to support their academic and personal growth. Because the ACS Scholars will become the leaders of tomorrow, the Society's goal is to empower them now by providing the opportunity to experience the joy of giving back to Carnegie Mellon. Each of the 36 ACS Scholars is given an additional $200 and the scholars work together throughout their senior year to decide how best to contribute their money back to the university.

CEE Students Wins Best Paper Award

Seungbum Kim, current Ph.D. student who is being advised by **Adjunct Professor Hoon Sohn**, won the Best Student Paper Award at the World Forum on Smart Materials and Smart Structures Technology held in Nanjing, China, May 26-27, 2007. The award was provided by B.F. Spencer, Jr.,

President of Asia-Pacific Network of Centers for Research in Smart Structures Technology. The title of Seungbum's paper is "Application of an instantaneous crack diagnosis technique to thin metal plates and panels".

Zhiqiang Li Receives Ji-Dian Liang Fellowship

Zhiqiang Li, first year PhD student received the 2006-07 Ji-Dian Liang Fellowship. Ji-Dian Liang was a Chinese classics scholar who believed in the importance of retaining the fundamentals of Chinese culture but at the same time diligently pursuing the best of Western science and technology. This fellowship provides Zhiqiang with a professional development grant.

CEE Students Travel to ASCE Workshop and Conference

CEE Students **Laura Seitz** and **Reiko Baugham** recently traveled to Princeton to participate in the ASCE Workshop on Student Chapter Leaders. The workshop focused on how to become a more successful student chapter, as well as the future of the engineering profession.

CEE Student **Linda Kaplan** traveled to the ASCE NorthEast Regional Younger Members Council (NERYMC) Conference. This conference focused on the skills needed by young professionals as they begin their careers as well as upcoming changes in engineering education. Workshops included public speaking and presentation preparation, going from project engineer to project manager, and engineering ethics.

Tanapon Phenrat Wins AWMA Award

Tanapon Phenrat, CEE Ph.D. candidate, has received the Jacqueline Shields Award from the Air & Waste Management Association. The $4,000 scholarship recognizes Tanapon's work on waste management issues. Tanapon will be recognized this June at the 100th Annual Conference and Exhibition in Pittsburgh. *Congratulations, Pom!*

Aurora Sharrard Receives Honorable Mention

CEE Ph.D. graduate Aurora Sharrard received an Honorable Mention for the Graduate Student Service Award. Presenting the award is Provost Mark Kamlet. The Graduate Student Service Award is intended to recognize a graduate student who has advanced the interests of Carnegie Mellon graduate students, improved the quality of life for graduate students on campus and/or contributed to the larger academic community. *Congratulations, Aurora!*

CEE Students Inducted into Phi Kappa Phi Honor Society

Eleven CEE students were inducted into Phi Kappa Phi, Carnegie Mellon's Honor Society on February 11, 2007. Undergraduates inducted include: Sona Avetisian,Laura Seitz and Stephanie Mie Seki. Graduate students include Michael Franzonello, Chris Gordon, Semiha Kiziltas, Fernanda Lustosa Leite, Ian Neill, Daniel Oliviera, Anu Pradhan, and Pingbo Tang. *Congratulations on your accomplishment!*

From left to right: Sona Avetisian, Fernanda Lustosa Leite, Anu Pradhan, Pingbo Tang, Semiha Kiziltas, Michael Franzonello and Ian Neill

ALUMNI 2007

Jimmy Carter Work Project 2006, Lonavla India

By Dennis Mialki, P.E. (CE'78)

Once every year, former President Jimmy Carter and his wife Rosalyn lead the Jimmy Carter Work Project, in which many homes are blitz-built by volunteers in one week of intense work. The 2006 Project was just outside of Malavli Village, which itself is outside of Lonavla, which in turn is about three hours southeast of Mumbai (formerly called Bombay). There is a tremendous need for decent housing in India. Habitat has been active in India for 20 years, but the need is staggering. Fully half of the 1.2 billion citizens of India live in substandard housing consisting of rusty sheet metal roofs and mud, bamboo, or plastic sheets for walls, and dirt floors. Some have less than this. Few have access to adequate drinking water and sanitary facilities.

Dennis is standing to right of President Carter and Mrs, Carter in burgundy hardhat

I was privileged to be able to work for 10 weeks as part of the Pre-Build and Logistics Team for the JCWP 2006, fabricating roofing components for the houses. In India, as well as in any country in which Habitat operates, homeowners are required to perform a certain number of sweat equity hours of work for their homes. And since 12 of the houses during Build Week were supervised by staff members from Habitat Latin American affiliates, who spoke limited English, it was also my job to translate for them from Spanish to English to Marathi to Hindi and back again.

We basically took an empty field and converted it into a new village for 100 families, with 100 homes (50 duplexes) built with concrete block walls, a concrete floor, tile roofs, secure metal doors and windows, running water, a toilet, and electricity.

The JCWP 2006 was the kickoff of the IndiaBuilds Project, which plans to house one million citizens of India during the next five years. It is an ambitious project, but one sorely needed in this country. The JCWP 2007 will be in Los Angeles, California. The JCWP 2008 will be in Egypt, and I plan to be there to work once again with President Carter and the Home Partners in that country.

Tom Krouskop *(E'71)*, Professor at Baylor College of Medicine, was awarded the Silver Antelope Award by the Houston Area Boy Scouts of America, for recognition by National Court of Honor to a scouter for distinguished service to youth within the region.

William "Red" Whitaker *(CE: MS '75, PhD, '79)* the Fredkin Research Professor of Robotics in the Robotics Institute in the School of Computer Science at Carnegie Mellon, has been named a University Professor, the highest distinction faculty can achieve at Carnegie Mellon. Whittaker has earned worldwide acclaim for developing mobile robots that work in unpredictable environments, like the interiors of abandoned coalmines, the craters of live volcanoes or inside the damaged nuclear reactor at Three Mile Island. He is founder of the Robotics Institute's Field Robotics Center and the National Robotics Engineering Center.

2007 CETI awards from the FIATECH Consortium

Recent alums **Dr. Chris Gordon** and **Dr. Esin Ergen** both won 2007 CETI awards from the FIATECH Consortium. CETI stands for Celebration of Engineering and Technology Innovation and FIATECH is a consortium of construction owners and technology companies dedicated to a vision of Fully Integrated and Automated Technology for Construction (see www.fiatech.org). Chris Gordon received the award, and Esin received an Honorable Mention, in the category of Outstanding Mind, meant for recent graduates to recognize the contributions they made in their PhD dissertation research. Chris Gordon was co-advised by Burcu Akinci and Jim Garrett, and Esin Ergen was advised by Burcu Akinci.

John R. Kenny, *P.E., DBIA (CE'82)*, was recently appointed a regional director for Gannett Fleming, an international planning, design, and construction management firm. Kenny oversees corporate operations for Gannett Fleming's 19-state West Region, which includes offices in Arizona, California, New Mexico, and Texas. Based in the firm's Phoenix, Arizona office, Kenny now directs the firm's planning, design, and program management of civil, environmental, and transportation projects throughout the West.

Roberta Marstellar *(E'93)* was named CFO of AISC, American Institute of Steel Construction, Inc. She recently completed an MBA, with honors at the University of Chicago.

John Kovacs *(E'93)* was elected President of the Pittsburgh Section of ASCE. In June 2006, John was named a vice president and the regional office manager for the Pittsburgh office of Gannett Fleming, an international planning, design, and construction management firm.

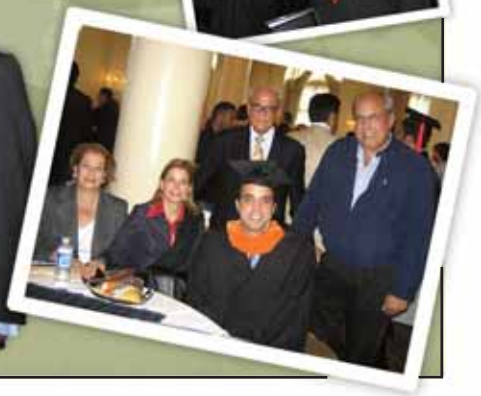
On a recent visit to campus, **Michael** *(E'65)* and **Julia Ellegood** participated in the first ever Dean's Weekend. Michael, a 1960 graduate of Civil Engineering, recently retired at the Director of Public Works for Maricopa County in Arizona. As part of the weekend, Michael took time to share his thoughts and experiences with students from the College of Engineering. Dean Pradeep Khosla commented that, "Mike's enthusiasm for the college and success in his career stand as an example of how important it is to have alumni actively involved with the college".

Millet Wei *(E'67)* was awarded the 2007 Tadeusz Sendzimir Memorial Medal in May at the AIST (Association for Iron & Steel Technology) Annual Conference. The medal was established in 1990 to perpetuate the memory of Dr. Tadeusz Sendzimir's achievements and engineering contributions in developing process equipment for the steel industry. The award is presented in recognition of an individual who has advanced steelmaking through the invention, development, or application of new manufacturing processes or equipment.

2007 COMMENCEMENT

M.S. and Ph.D. Recipients

B.S. Recipients



AWARDS

ASCE Outstanding Civil Engineering Student Award – Linda Kaplan

H. A. Thomas, Sr. Distinguished Service Award – Corinne Scown

H. A. Thomas, Sr. Scholarship Award – Nicholas Greco & William Kotterman

The James P. Romualdi Civil and Environmental Engineering Award – Anand Boscha & Joseph Nam

Outstanding Teaching Assistant Award – Semiha Kiziltas & Navid Saleh

Paul P. Christiano Distinguished Service Award – Saurabh Puri & Heather Wakeley

Mao Yisheng Outstanding Dissertation Award – Ran Liu

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CEE Alumni Blast ~ July 28, 2007

Alumni, please have your family join the CEE family for a morning of reacquainting yourself to the department and university and an afternoon of barbeque, games and fun. Fun projects for the children during the morning too! To RSVP and for more info: please email Patty Langer at **patty@andrew.cmu.edu** or call at 412-268-1070.

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Spring/Summer 2007

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