



Department of Civil and Construction Engineering

WESTERN MICHIGAN UNIVERSITY

The CCE News

Building the foundation for a better tomorrow

Vol. 2, December 2010

A Word From Our Chair



Dear Broncos and Friends;

I am delighted to present the Fall 2010 Civil and Construction Engineering (CCE) Newsletter. I hope you enjoy the articles and take as much pride as I do in the accomplishments of our students, our faculty and our alumni. Our Civil and Construction programs evolved from the Construction Engineering (CEM) program which evolved from Construction Science and Management (CSM) program. We are especially proud of our alumni from these earlier programs. Their accomplishments and success have allowed us to

develop the most recent civil and construction engineering programs. As of fall 2010, our department's current undergraduate enrollment has remained steady at 270 students. The degrees conferred for the 2009-2010 academic year include 30 Bachelor of Science degrees in civil engineering, 10 Bachelor of Science degrees in construction engineering, and 6 Master of Science degrees.

CCE faculty are preparing for a visit from the Accreditation Board of Engineering and Technology (ABET) during fall of 2011. Both of our programs have been accredited through 2012 (Construction Engineering since 2000 and Civil Engineering since 2004). This visit regards the renewal of the accreditation. The department and the faculty will document our high educational standards to assure continued accreditation.

This year we added three new faculty positions. Two of these positions are in construction and one in civil. You will be reading more about the expertise and background of two of our new faculty, Dr. Upul Attanayake and Dr. Pingbo Tang. Our third faculty is also in the construction area and will be coming to Kalamazoo during the summer of 2011 from University of Canterbury at Christchurch, New Zealand. Also, in this issue, the faculty member who joined us in fall of 2008, Dr. Xiaoyun Shao, will describe the accomplishments of her first two years.

During the 2009-2010 academic year, we also restructured the two semester senior level capstone design course (Senior Design I and II) in order to assure the outcome of educating career-ready engineers. Mr. John S. Polasek is our new adjunct professor of practice who is the faculty in charge of these courses. You will read more about him and the restructuring in this issue. We have also developed a new service learning initiative, "Safe Routes to School," for our incoming first-year students in partnership with our American Society of Civil Engineers (ASCE) student chapter and the Michigan Department of Transportation. As part of Safe Routes to School, our first-year students will be designing and/or evaluating walking and biking paths to area elementary schools.

In this initiative, each year the CCE freshman class will be working with a different area elementary school. On this issue Dr. Edmund Tsang will describe this initiative.

Through reading this issue further, you will also be proud of our ASCE student chapter. Not only did they successfully organized the North Central Regional Conference this past year, but they also came in second place in the Concrete Canoe Competition and made a strong showing at the Steel Bridge Competition.

As a final note, we, the faculty of the CCE department, pledge to remain on the path toward excellence and continue the department's steadily growing reputation. We will continue to create new programs and opportunities for our students both at home and abroad. As civil and construction engineers, we have both the opportunity and responsibility to improve and sustain quality of life for all people on our planet.

Haluk Aktan
Chair

Safe Routes To School by Edmund Tsang

For Fall Semester 2010, ENGR 1001 has a new partner, Washington Writers Academy, for its service-learning design project called Safe Routes To School (SRTS). The goal of SRTS is to promote student physical wellness by making walking or biking to school safe and fun, while reducing traffic on the road and carbon dioxide emissions. The SRTS design project is supported by the Michigan Department of Transportation (MDOT). Members of the WMU Student Chapter of the American Society of Civil Engineers (ASCE) are also supporting SRTS by mentoring the first-year students enrolled in ENGR 1001. Lessons learned from the pilot implementation of SRTS in the Fall Semester of 2010 will guide future work with other school partners in Kalamazoo, MI to promote student physical wellness and the protection of the environment.

Past service-learning design projects CCE first-year students have been engaged in while taking ENGR 1001 include the design and fabrication of an instruction device that simulate x-ray diffraction of single crystals, which has been donated to the Advanced Physics Lab of Loy Norrix High School in Kalamazoo, MI. Another service learning design project past ENGR 1001 students have worked on is an instruction device that illustrates light reflection, refraction, transmission, and absorption occurring concurrently. The project received a \$500 cash award at the 2010 Idea to Product for Social Entrepreneurial ship National Competition (won by Chad Albert and Andrew Paglia).



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Dr. Xiaoyun (Sarah) Shao's First 2 Years at WMU



Dr. Xiaoyun Shao holds a B.A. and M.S. in Structural Engineering from Tongji University in China, and a Ph.D. in Structural engineering from University at Buffalo, The State University of New York. She joined the Civil and Construction Engineering (CCE) Department at WMU in 2008 as an Assistant Professor and in 2010 became a Professional Engineer registered in the State of Michigan.

Dr. Shao's research interests primarily focus on earthquake engineering, structural health monitoring and novel structural material application.

Earthquake engineering is a branch of civil engineering devoted to mitigating earthquake hazards. Earthquake engineers investigate and solve the problems created by damaging earthquakes, and consequently apply these solutions in planning, designing, constructing and managing earthquake-resistant structures and facilities. Structural health monitoring, on the other hand, has the main goal to *accurately* and *efficiently* detect structural damages of both buildings and bridges due to long-term deterioration processes or extreme events such as an Earthquakes or blasts. Dr. Shao has been active in these research areas since her arrival at Western Michigan University.

Dr. Shao's first project was to establish a research laboratory for her research as well as for education and outreach activities. The major equipment includes a uni-axial earthquake simulator (commonly called shake table), two 3kip hydraulic actuators with the supporting hydraulic power supply, and an advanced real time controller.

The shake table is 3 ft. x 3 ft. and can subject a specimen with a maximum weight of 500 lb to an earthquake time history with peak acceleration up to 4 g. Structural dynamic properties and its response when attacked by an earthquake are obtained through such shake table tests. Also, new earthquake mitigation techniques to reduce the structural damage can be validated through such an experiment. Moreover, students will be directly exposed to a "real earthquake" and have the opportunity to observe its effect on structural response during and after the earthquake.

Instrumentation available in the lab includes accelerometers, a linear variable displacement transducer (LVDT), and a wireless sensor network. A complete list of the lab equipment and instrumentation currently available can be found at <http://homepages.wmich.edu/~dpb8848/research.html>. Dr. Shao hopes to use this equipment to attract more students in learning about earthquake engineering.

Mark Joseph Humiecki, a Master's degree student who graduated in spring 2010, worked with Dr. Shao on a research project to conduct structural health monitoring using smart wireless sensors. In his thesis entitled "Investigation of damage detection methods with a wireless sensor network," he first numerically simulated three damage detection methods: Modal Assurance Criterion (MAC), Damage Location Assurance Criterion (DLAC), and a method which utilizes the change of the structures flexibility. Then, he designed and constructed a three-story shear type structural model as the benchmark structure. Equipped with wireless sensors, the benchmark structure was used to experimentally evaluate the accuracy and efficiency of the three damage detection methods for structural health monitoring

Dr. Shao, John W. Van de Lindt (University of Alabama), Mikhail Gershfeld (California State Polytechnic University), Michael Symans (Rensselaer Polytechnic Institute), and Weichiang



Figure 1 Uni-axial earthquake simulator (shake table) for earthquake engineering research and education

Pang (Clemson University) performed the work that obtained \$1.23 million from the National Science Foundation grant on August 26, 2010.

The funded project is a Network for Earthquake Engineering Simulation (NEES) Research (NEESR) project, named "NEESR-CR: NEESsoft Seismic risk reduction for soft-story, wood frame buildings," which aims to make wood frame buildings safe from earthquake damage. As early as 1970, the structural engineering and building safety community recognized that a large number of two-, three- and even some four-story wood frame buildings designed with the first floor used either for parking or commercial space were built with readily identifiable structural system deficiencies, referred to as a "soft story." Thus, many older multi-story, wood frame buildings (built prior to 1970s) are susceptible to collapse at the first story during earthquakes. Most cities and counties recognize this as a disaster preparedness problem and have been actively developing various ordinances and mitigation plans to address this threat. However, the mechanism that induces collapse of such buildings is not well understood. The NEESsoft project will (1) enable the seismic retrofit of soft-story, wood frame buildings based on performance, (2) experimentally validate recently proposed concepts in for retrofit of soft-story, wood frame buildings, and (3) provide a fundamental understanding of the way wood frame buildings collapse through a systematic experimental program consisting of three major test types at two NEES facilities. Upon completion, the project will (1) improve the fundamental understanding of collapse mechanisms in wood frame buildings, (2) improve seismic numerical modeling including collapse modeling of wood frame buildings, (3) provide a performance-based approach and guidelines for retrofitting soft-story, wood frame buildings using seismic protection devices, and (4) enable a more accurate calculation of the margin against collapse for design code development.

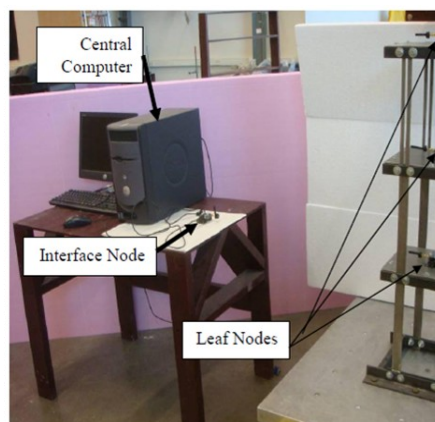


Figure 2 Wireless sensor network structure for structure health monitoring



Dr. Pingbo Tang

Our new construction faculty, Dr. Pingbo Tang

Pingbo Tang is from the People's Republic of China (China Mainland). He grew up in Hengyang, a city in South China, Hunan Province. Hengyang is located to the South of "Heng Shan" (Chinese spelling of "Heng Mountain"), which is one of the five Sacred Mountains in Chinese history, where Emperors present offerings to Heaven for the welfare of Chinese people. "Hengyang" means "South side of Heng Mountain". It is a very beautiful place breeding many great people in Chinese history.

He obtained his Bachelor's Degree in bridge engineering in 2002, and his Master's Degree in bridge engineering in 2005, both from Tongji University, Shanghai, China. In 2005, he became a PhD student of the Advanced Infrastructure System group at Carnegie Mellon University (CMU). In August 2009, he received his PhD degree with a doctoral dissertation entitled "Extraction of Surveying Goals from Point Clouds Obtained from Laser Scanners to Support Bridge Inspection" and joined the Mapping and GIS Lab at Ohio State University (OSU) as a post Doctoral researcher. At OSU, he was responsible for managing multiple research projects, most of which were related to computer vision-based robot localization and spatial data

management for interplanetary exploration. He got to know WMU when he entered the area of applying imaging technology to construction and infrastructure management, which was in 2005. He found one of Dr. Osama Abudayyeh's papers, which described an image database for bridge management. Afterward, he worked with the research group at WMU. He is very impressed by the productive faculty and students in the peaceful and lovely city of Kalamazoo, and has a dream of creating an intelligent future of construction and facility management together with excellent peers at Western. He left OSU in August 2010 and started his teaching and research at Western Michigan University as a tenure-track assistant professor. He is currently teaching courses in the construction management.

Looking back, he has been experiencing multiple interesting academic areas such as bridge engineering, knowledge engineering, computer vision, construction management, and facility management. The dream of becoming a person who can change people's daily life drives his life-long journey. As a civil engineering educator and researcher, he feels that he can develop technology for enabling intelligent living and working environments and influence his students, helping them to pursue their dreams as engineers. All of these experiences are great opportunities for him to enjoy the intelligence of people and computers, and they will be keeping him running on the road of engineering research and education.

He married Ms. Yanxiang You in 2005, and they have one son, Yuantao Tang, who was born in September 2009, in Columbus, Ohio.

Our new structures faculty Dr. Upul Attanayake

When Upul was a child, others his age and older expressed grief about studying mathematics, believing Ralph J. Cordiner's statement, "Whether a man lags behind or moves ahead in his specialty is a matter of his own personal application. This is something which takes time, work, and sacrifice. Nobody can do it for you." He decided to succeed in math which led him to be an engineer. Upul liked civil engineering because civil engineers are always with the public assuring their safety, health, and welfare.

Upul Attanayake was born in a rural village in Sri Lanka, in a family of five, including his two brothers: Thilak and Nalin. He graduated from the University of Peradeniya, Sri Lanka in 1998 with a B.Sc. (Eng.) degree and with honors. To realize his parents' dream of having a child with a PhD, he entered the Asian Institute of Technology (AIT), Bangkok, Thailand, after receiving the Millennium Scholarship sponsored by the Government of Norway. He obtained his M.Eng degree specializing in structural engineering in 2001. Upul successfully secured a graduate research assistantship from the Center for Structural Durability at Wayne State University, Detroit, Michigan, and worked toward receiving a PhD. He's worked on several Michigan Department of Transportation sponsored research projects on condition assessment and health monitoring of highway bridges. Upul graduated from Wayne State University in 2006 and worked as a postdoctoral researcher at the Center for Structural Durability until December 2006. In January 2007, he joined Western Michigan University as a research associate. In August 2008, Dr. Attanayake assumed duties as a non-tenure track Assistant Professor. Also, Dr. Attanayake was instrumental in bringing close to 1 million dollars to Western through collaborative research since 2007. His hard work and dedication earned him a tenure-track faculty position at Western.



Dr. Upul Attanayake

Dr. Attanayake and his wife, Sanjeevani, decided to live in Michigan because they had been here for long time and have many friends. They think that changing weather helps them to see the value of different climates: warm and cold. Their three daughters, Pavitra, Samadhi, and Poojani, keep the Attanayake family fully engaged with the community through their school and other extracurricular activities.

Dr. Attanayake enjoys teaching because it helps to build a special community while research activities are vital to equip students with state-of-the-art technology and knowledge. Dr. Attanayake is currently focusing on developing new laboratories and bridging more research to help undergraduate and graduate students realize their dream of quality education and training here at Western.

A word about scholarship awards

Chee Kian Teng Master Studies is from Bacang, Melaka GPA 4.00
and
Adam L. Mueller Junior is from Portage, MI GPA 4.00

Capstone Design Factory (Senior Design) Program for Civil and Construction Engineering (CCE) gets new coordinator and new look

John S. Polasek, P.E. was brought on board in fall of 2009 to coordinate and spearhead changes to the CCE Senior Design Program. He came to WMU as a retiree from the Michigan Department of Transportation with 39 years of experience in the civil engineering profession. His goal is to bring together industry and students so the civil and construction engineers of the future will attain real life experiences through these partnerships.



These “real life” experiences start with the support of the CCE Industrial Advisory Board made up of consultants, developers, contractors, and governmental agencies. The next step is to partner with other engineering companies, contractors and government agencies from around the State. During the first semester of Senior Design, partnerships are formed and produce many real life projects from which students choose their Senior Design Projects. These projects are sponsored by various firms and agencies; their scopes vary greatly and contain almost every element of the civil and construction engineering profession.

Once projects are chosen by the teams, they meet with the project sponsors to establish a client/consultant relationship. This emulates the business world by making the sponsor the client who has sent out a “Request for Proposals” (RFP). The student team responds as the consultant on the project. They then write a project proposal to send to the client for consideration of hiring their firm to design the proposed project. Each proposal contains elements of real life proposals such as project understanding, scope of work, deliverables, production work schedule, and their team’s expertise. In the business world this is how consultants get work and contractors become successful bidders.

During the second semester of the program, project scopes and deliverables are completed. To once again simulate the real world, detailed progress reports are due bi-weekly and sent to the clients as well as the program coordinator. These reports contain information on what the team has completed, and whether or not they are on schedule. If they are not, they provide methods they are using to get back on schedule along with a revised production work plan. Finally, each student team gives a presentation on their completed project at the Senior Design conference each semester and prepares a final project report to complete the course study.

American Society of Civil Engineers (ASCE) student chapter

The Western Michigan University American Society of Civil Engineers (ASCE) student chapter is looking to build on last year’s successes as they move into the 2010-2011 school year. Last fall, the chapter was recognized as the “2009 Most Improved Student Chapter” by ASCE. With a large portion of the membership graduating in



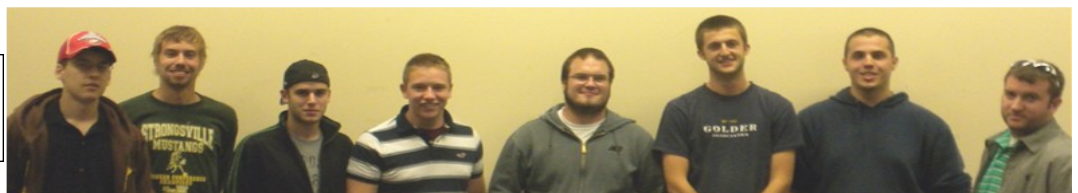
April, new student recruitment will be key in ensuring that the chapter will continue to be successful. The chapter participates in Adopt-a-Highway and Habitat for Humanity, as well as campus-wide service projects. Social events, networking opportunities with faculty and industry professionals, and the Concrete Canoe and Steel Bridge teams provide students with plenty of opportunities for involvement.

The Concrete Canoe team is coming off a second place finish in the North Central Regional Competition. Under the leadership of canoe captain Lindsay Mukans, the team is improving on the advancements of last year’s design to overtake Michigan Tech for first place and compete at the National Competition. The key focus of this year’s design will be on building a lightweight and durable canoe that promotes sustainable and environmentally conscious engineering.



2010-2011 Canoe Team

2010-2011 Steel Bridge Team



The CCE News is published by the
 Department of Civil & Construction Engineering
 Western Michigan University
 College of Engineering & Applied Sciences
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<http://www.wmich.edu/cce>

The CCE News

Congratulations CCE Class of Fall 2009

B.S. Civil Engineering

Baker, James J.
 Cleary, Wade E.
 Kalso, Keane P.
 Livingston, Jason R.
 Meeks, Jonathan R.
 Vincent, Corey A.

M.S. Civil Engineering

Albelwi, Naif S.
 Alhubail, Nahedh M.
 Althobaiti, Sultan M.
 Bayha, John J.
 Mohammed, Zameeruddin
 Thote, Mugdha



Congratulations CCE Class of Spring 2010

B.S. Civil Engineering

Albert, Chad J.
 Arseneau, Christopher J.
 Blosser, Tyler C.
 Boyce, Scott M.
 Brooks, Andrew J.
 Gebhard Andrew K.
 Herberg, Nathan A.
 Jacobsma, Eric S.
 Kwok, Melinda
 Lehman, Alexander R.
 Luther, Emma M.
 Mckindles, Adam E.
 Norton, Ryan
 Pagano, Paul J.
 Phillips, Kevin J.
 Porrett, Allison R.
 Richmond, Britney L.
 Ruffing, Matthew J.
 Sinkovitz, Matthew J.
 Sommers, Bret C.
 Teng, Chee Kian
 Vasilnek, Kendall R.
 Warners, Kimberly A

B.S. Construction Engineering

Benson, John J.
 Britton, Geoffrey S.
 Johnson, Michael L.
 Kehn, Andrew P.
 Nowinski, Ryan T.
 Scheffers, Nathan B.
 Stemler, Douglas B.
 Vanblarcum, Timothy J.
 Wagenmaker, Nathan J.

M.S. Civil Engineering

Alghandi, Sami G.
 Alotaibi, Ahmad M.
 Alotaibi, Hani F.
 Humiecki, Mark J.
 Msawealfi, Moutaz M.

Congratulations CCE Class of Summer 2010

Girbach, Chad R. (BS Eng Civil)
 Hedrick, Mark L. (BS Eng Construction)
 Romkema, Michael A. (MS Eng Civil)