CIVIL AND ENVIRONMENTAL ENGINEERING
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

CEE PIPELINE FALL 2014

CHAIR'S MESSAGE

Houssam Toutanji,
Chair and Professor

I am very excited to share this issue of our newsletter with you to give you an update on the progress of the Department of Civil and Environmental Engineering at UAH. In this edition, I would like to share with you a number of activities in research and education taking place within the department. We are pleased to welcome Drs. Hongyu Zhou and Tingting Wu to our department. Dr. Zhou received his Bachelor's degree in Structural Engineering from Tongji University in 2010 and his M.S. and Ph.D. from Arizona State University in 2012 and 2013, respectively. His research area is in structural and infrastructural materials. Dr. Wu earned her Ph.D. in Environmental Engineering from the University of Florida in Dec. 2010. She received her Bachelor's and Master's degrees from Tongji University, China and the National University of Singapore, respectively. Most recently, she worked as a postdoctoral associate at the University of Miami focusing on the development of design principles for low-energy and low-emissions net-zero water buildings of the future.

Our faculty continues to excel in research, conducting cutting-edge research in many areas and earning national recognition. Our faculty receives funding from NASA, NSF, ALDOT, FHWA and DOD. Our graduates continue to have a wide range of opportunities that exist on many fronts. Some of the companies who have recruited our students include the US Army Corps of Engineers, US Navy officer programs, the US Air Force, the US Space and Rocket Center, the US Department of Transportation, and the NASA/Marshall Space Flight Center. Our ASCE Student Chapter continues to be active and

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UAH concrete canoe team placed third at Southeast Regional Competition.

Our concrete canoe team finished third in the Southeastern Regional competition held in Tampa, Florida. This was one of the largest and most competitive student competitions the team faced, where 24 teams competed in 14 different competitons. So far, Team UAH has proudly represented the Southeast Region sixteen times at the national level. We have five national wins and three second places finishing to our credit.

Next year Southeast Regional competition will be held at Chattanooga in the month of March. If you think you'd like to give racing a try - "**C'mon join our Team!**". Students from all disciplines are welcome to join the team. Additional information can be found on our websites: *www.concretecanoe.org*; *www.TeamUAH.org*.

growing. Our joint Ph.D. program with the University of Alabama at Birmingham is vibrant and thriving. We have more course offerings between the two campuses via Intercampus Interactive Telepresence System (IITS) than ever before.

As we come to a new academic year, the department is currently undergoing annual strategic planning and program assessment, not to mention that the next ABET accreditation visit is just around the corner, fall 2015. These endeavors are critical to the future success and growth of the department. Please feel free to stop by for a visit next time you are in the area. I would very much enjoy meeting with you and sharing with you information about teaching, research and community service.

We hope that you will enjoy reading our newsletter!

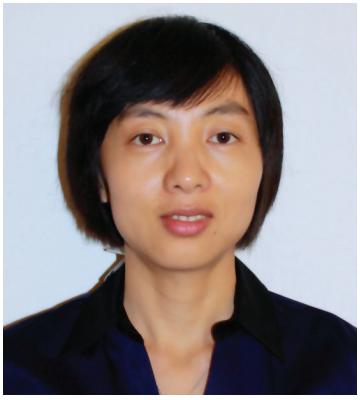
Houssam Toutanji, Chair and Professor.

Staff News

Gabriele Cromartie

The Department of Civil and Environmental Engineering and the College of Engineering at UAH is also pleased to welcome Gabriele "Gaby" Cromartie as the new Staff Assistant in the Civil & Environmental Engineering Department. Gaby comes to CEE from a stint as an Event Coordinator at College of Business. Before moving to Alabama Gaby spent eleven years living in Asia and Europe with her children and husband; a retired Army Officer. Gaby previously served as the Executive Secretary for the Dean of the University of RheinMain, College of Design, Computer Science and Media Communications in Wiesbaden, Germany, and as an Information Management Officer for the US Army Property Book Officer in Hohenfels, Germany. Gaby has studied Home Economics, Communications, English and Financial Management in the United Kingdom, South Korea and in Germany. Her bilingual ability served her well as a Protocol Action Officer for the Mayor of Stuttgart, Germany, where she was responsible for the partnership between Stuttgart and St. Louis, Missouri, and for German-American relations with the US European Command. She and her husband are proud parents of Ashley (US Airways Flight Attendant) and Shawn (Bob Jones High School Senior).

New Faculty Profiles



Dr. Tingting Wu

The College of Engineering at UAH is very pleased to welcome Dr. Tingting Wu, appointed as Assistant Professor of Civil and Environmental Engineering in August 2014. Her doctoral research focused on the development and evaluation of engineered media that can be utilized to remove dissolved phosphorus in urban waters from both point source and non-point source. Most recently, she worked as a postdoctoral associate at the University of Miami focusing on the development of design principles for low-energy, low-emissions net-zero water buildings of the future. Her research interests include sustainable water/wastewater treatment and reuse, advanced water treatment, and stormwater/non-point source pollution control.

Dr. Wu earned her Ph.D. in Environmental Engineering from the University of Florida in Dec. 2010. She received B. Eng and M. Eng from Tongji University, China and the National University of Singapore, respectively.

Dr. Hongyu Zhou is an Assistant Professor in Civil Engineering. His research interests include the development and characterization of innovative infrastructural materials, mechanics for composites, and structural multi-hazards damage mitigation. Dr. Zhou is leading the Infrastructure Hazard Mitigation and Intelligent Materials (IHM&IM) laboratory, which conducts research on the synergetic roles of structures and structural materials in resisting natural and anthropogenic hazards. His work involves the experimental testing of civil infrastructures/structural components under extreme load conditions such as earthquake and tornado; and the development of innovative structural materials including natural composites. Dr. Hongyu Zhou received his Bachelor's degree in Structural Engineering from Tongji University in 2010 and his M.S. and Ph.D. from Arizona State University in 2012 and 2013, respectively. He is a recipient of a fellowship from US Department of Homeland Security to perform joint research with Oak Ridge National Laboratory (ORNL) on the microstructures and micromechanical behaviors of advanced composite materials.

Dr. Hongyu Zhou

Student Graduate Projects & Dissertations

Name: **Mary Catherine Dondapati**, 2013
Dissertation Title: Building trip generation models from national database for medium sized communities. (Ph.D.)
Advisor: M. Anderson

Name: **Rajesh Vuddandam**, 2014
Dissertation Title: Design guidelines to FRP strengthened reinforced concrete structures: An emphasis on developing plate-end debonding failure criterion. (Ph.D.)
Advisor: H. Toutanji

Name: **Dong Wang**, 2014
Dissertation Title: Flexural models for reinforced concrete beams with CFRP strengthening, under monotonic and cyclic loadings. (Ph.D.)
Advisor: H. Toutanji

Name: **Keerthi Sardi**, 2013
Non-Thesis Title: Validating simulation models of diverging diamond interchange for Alabama. (M.S.E.)
Advisor: M. Anderson

Name: **Stephanie Farrell**, 2013
Non-Thesis Title: ALSAFE: Quantitative macro-level safety forecasting for Alabama transportation planning. (M.S.E.)
Advisor: M. Anderson

Name: **Ahmed ELSayed**, 2014
Non-Thesis Title: Reinforced concrete bridge design. (M.S.E.)
Advisor: H. Toutanji

Name: **Jordan Panter**, 2014
Non-Thesis Title: A novel design of 2 story steel framed office building. (M.S.E.)
Advisor: H. Toutanji

Name: **Jason Levandoski**, 2014
Non-Thesis Title: usRAP and Mobile County. (M.S.E.)
Advisor: M. Anderson

Civil Engineering Program Outstanding Graduate Student for 2014

Stephanie Farrell, a native of Huntsville, was attracted to the University of Alabama in Huntsville due to its strong engineering school, provision of the opportunity to personally contribute to research advances, as well as its desirable location within the state. Since entering graduate school at UAH, she has focused her research on traffic safety advances for the Alabama Department of Transportation (ALDOT), while focusing her studies on environmental and structural engineering facets. Stephanie is sincerely honored to be recognized with the Civil Engineering Program Outstanding Graduate Student Award 2014.

Faculty Publications

Reddy, K. R., and **Al-Hamdan, A. Z.** "Enhanced Sequential Flushing Process for Removal of Mixed Contaminants from Soils", Water Air and Soil Pollution, Vol. 224, No. 1709, 2013.

Kim, J., **Anderson, M.D.**, Wilson, J.P. "Impact Analysis of the Panama Canal Expansion on Alabama", International Journal of Traffic and Transportation Engineering, Vol. 3, No. 2, 2014.

Anderson, M.D., Kenchappagoudra, M., Dondapati, M.C., Harris, G.A. "Pass-Through Freight Modeling at the Statewide and Metropolitan Level", International Journal for Traffic and Transport Engineering, Vol. 4, No.1, 2014.

Lin, Y.C. "Seismic Behavior of Steel Coupled Beam Moment Frame Based on Static Nonlinear Analyses," Journal of Constructional Steel Research, 2014 (in press).

Lin, Y.C., Sause, R., and Ricles, J.M. "Seismic Performance of a Steel Self-Centering Moment Resisting Frame: Hybrid Simulations under DBE," ASCE Journal of Structural Engineering; Vol. 139, No. 11, 2013.

Ueno, S., **Toutanji, H.**, Vuddandam, R.. "Introduction of Critical Stress State Criterion to Predict Bond Strength between FRP and Concrete Substrate" ASCE Composites for Construction Journal, 2014 (in press).

Zhou H., Dhiradhamvit K., and Attard T.L. "Tornado-borne debris impact performance of an innovative storm safe room system protected by a carbon fiber reinforced hybrid-polymer matrix composite," Engineering Structures, Vol. 59, 2014.

Student Profiles

Zhenglai Shen

Ph.D. Student - Zhenglai Shen

Zhenglai Shen is a Ph.D. student in Civil Engineering at UAH. He earned his B.S. in Civil Engineering from Central South University of Forestry and Technology in 2006, and M.S. from Tongji University in 2010. Prior to joining UAH, Zhenglai was a research graduate student at Arizona State University in Construction Engineering from January to December 2013.

Zhenglai is currently working with Dr. Hongyu Zhou on developing computational models for composite laminates containing soft layers using the piece-wise warping (or "Zig-zag") theory. Composite laminated beams/plates/shells have been increasingly used in various structures including aircraft, space vehicles, automobiles, as well as civil infrastructures due to their high strength-to-weight and stiffness-to-weight ratios. In order to deal with the warping effect encountered by many emerging multifunctional composites, a piecewise warping theory was developed to account for the interaction between the soft and stiff layers existing in composite laminates. The model may be also applicable for predicting the behavior of larger structural component/system such as composite sandwich panels and elastomeric seismic bearings. "By far, we have established the model for an n-layer composite laminated beam, and the free vibration results calculated using this model coincided well with experimental results. We will be generating some exciting results very soon."

M.S.E. Student - Paisley Marotta

Paisley Marotta

Paisley Marotta is a first year graduate student at UAH. Originally from Madison, AL, but she hasn't lived here for many years. Paisley graduated with her Bachelor's degree from the University of Alabama at Birmingham (UAB) in 2012. Soon after graduation, she moved to Kansas to work for a government contractor where she was responsible for data management. Her drive to do more engineering related work brought her back to Huntsville to pursue her Master's degree at UAH.

Paisley is currently working with Dr. Hongyu Zhou on developing a new generation of bamboo fiber composites. As one of the fast-growing plants on earth, bamboo has long been used as a construction material in Asia and South America. Regardless of their weak biological constituents, many species of bamboo timber exhibit remarkably high strength and toughness. The superior mechanical properties of bamboo timbers can largely be attributed to their dense cellular fibers. "We believe the attributes of bamboo fiber make it a suitable reinforcement for engineering composite materials. It's also more sustainable and environmental-friendly than synthetic fibers." Paisley is exploring the possibility of using bamboo fiber composites to retrofit/strengthen reinforced concrete structures. She is working with her group to resolve technical challenges such as how to preserve the strength of natural fibers in harsh environments. A two-phase study will take place. Soon she will start fabricating composite coupon samples using carbon, glass, and bamboo fibers, and the coupons will be placed in environmental chambers to study the material degradation under natural weathering effects. During the second phase of this study, she will also evaluate bamboo fiber composite retrofitted concrete beams in various load conditions, including fatigue. "Bamboo is an interesting material to work with, and I'm excited to start the hands-on portion of my research."

Matthew Hussak

M.S.E. Student - Matthew Hussak

Pittsburgh Pennsylvania, the "City of Bridges", it's the place I grew up in. Driving around the city and seeing all those incredible structures is what sparked my passion for civil engineering. When an opportunity arose to do research on bridge scour throughout Alabama, I knew it was right for me.

Scour is the number one failure method of bridges in the United States. High water flows can cause erosion around the piers and abutments, which exposes the foundation. This can then lead to an unexpected failure of the bridge. To ensure the safety of the bridge and public, scour calculations must be performed on all bridges over waterways, and proper countermeasure must be implemented, if scour is determined to be critical to the structure.

There are still many bridges throughout Alabama that have not been examined for scour risk. The focus of my research will be to do site evaluation and surveying at sites that have not been examined for scour, determine if a site is scour critical, and implement a scour countermeasure as needed. I will also research alternative scour countermeasures on the market, and recommend suitable alternatives to ALDOT to consider for use in current and future projects. My hope is that this research can increase the safety of bridges throughout Alabama.

Faculty Research Grants/Contracts

Dr. Ying-Cheng Lin – "Self-Centering Connections for Traffic Sign Structures," Alabama Department of Transportation, $106,504.

Dr. Mike Anderson – "Procurement of a Simulator to Support Rural Transit Driver Training", sponsored by Alabama Department of Transportation, $1,193,614.

Dr. Hongyu Zhou – "Development of a New Generation of Bioinspired Multifunctional Composites - From Microstructure to Structural Applications", sponsored by UAH - Individual Investigator Distinguished Research, $49,967.

Dr. Hongyu Zhou – "Establishing the Infrastructure Hazard Mitigation and Intelligent Materials Laboratory for Interactive Research on Civil Structures and Infrastructural Materials", sponsored by UAH - Research Infrastructure Fund, $149,925.

UAH College of Engineering Outstanding Faculty Teaching Award

Dr. Ashraf Al-Hamdan is a lecturer in the Department of Civil and Environmental Engineering at the University of Alabama in Huntsville. He has been teaching undergraduate and graduate level courses in the areas of geotechnical, structural, and environmental engineering. He is knowledgeable and a caring faculty member committed to education excellence. He strongly believes that teaching plays a significant role in preparing students to become competent engineers. He was awarded the 2013-2014 UAH College of Engineering Outstanding Faculty Teaching Award.

Dr. Ashraf Al-Hamdan

UAH Steel Bridge team competes at Southeast Regional Competition for the first time, finishing overall at eleven out of 24 universities competed

The UAH Steel Bridge Team competed in the Southeast Regional Competition in March, finishing in 11th out of 24 overall, including an 8th place finish in structural efficiency. The 11th place finish was also the best of all the Alabama universities.

This was the first time UAH has competed in this competition in over eight years. The goal for this year was simple, to build a bridge that could finish the competition. With that goal in mind, the team is now looking to finish in the top 4 to qualify for national next year. It will be a challenging task, but the club is ready to take the next step. For more information, visit us at www.TeamUAH.org or follow us on Facebook at www.facebook.com/groups/uah.asce.

Outstanding Alumni of Civil Engineering Program

Jacqueline (Marriott) Wilson, E.I., M.ASCE

In 2012, Jacqueline Wilson graduated from UAH Magna Cum Laude with a Bachelor of Science Degree in Civil Engineering. Since then, she has worked for 3M in Decatur, AL, and KAYA Associates, Inc. (www.kayacorp.com) a small multi-disciplinary business headquartered in Huntsville, AL.

At KAYA, Jacqueline works as a Staff Engineer II and Project Manager, and has already traveled on project assignments to Alaska, Kwajalein, North Dakota, Hawaii, and California. The majority of her work is providing facilities engineering support for the Missile Defense Complex (MDC) at Fort Greely, Alaska (FGA). The MDC at FGA is part of the United States' presidentially mandated national missile defense program.

Jacqueline is a current member of the American Society of Civil Engineers (ASCE), Tau Beta Pi (TBP), and Order of the Engineer. Last year, she was awarded the prestigious ASCE Daniel W. Mead Prize for Younger Members for her paper on engineering ethics.

When she is not working, Jacqueline likes spending time with her husband Dr. Jeffrey Wilson (Instructor and Post-Doctoral Research Associate at UAH) and her family. She is also an avid volunteer and has served as KAYA's 2013-2014 Team Captain for a local Amyotrophic Lateral Sclerosis (ALS) charity walk.

One of Jacqueline's personal goals is to inspire and challenge other young women to pursue careers in the field of engineering. To this end, she has recently volunteered time at two Alabama schools (Legacy Elementary and Hartselle High) as part of STEM outreach events to teach students what engineering is, and explain the path to professional licensure.

$1.2 million driving simulator finds home in UAH's College of Engineering

RIDE Driving Simulator - Outide View

The University of Alabama in Huntsville is pleased to announce the arrival of a brand-new high-tech driving simulator, which will be used to provide hands-on training to rural transit operators throughout the state.

Known as RIDE (Real-Time Instruction for Driver Education), the simulator is funded by a $1.2 million grant from Alabama Department of Transportation (ALDOT) and will be located outside of Olin B. King Technology Hall on the UAH campus. Its operation will be overseen by the Department of Civil & Environmental Engineering in the College of Engineering.

"We are really excited to be able to offer this training opportunity to rural transit operators in Alabama, who provide an important service to underserved populations living in less accessible areas of the state," says Dr. Michael Anderson, associate professor and coordinator of the RIDE program. "We hope to one day expand it to include the many state agencies that also provide transportation to the elderly and disabled."

The simulator's curriculum will include decision driving, close-quarters maneuvering, negotiating intersections, and night/fog driving, all with the goal of reducing accidents and increas-

Dr. Michael Anderson

$1.2 million driving simulator finds home in UAH's College of Engineering (Contd..)

RIDE Driving Simulator - Inside View

ing passenger and driver safety. Additional scenarios can also be developed on an as-needed basis using RIDE's non-mobile companion simulator, which will be housed in the Department of Civil & Environmental Engineering.

"RIDE would not have been possible without the support we've received from ALDOT, and we look forward to partnering with them on this educational outreach initiative," says Dr. Anderson, adding those interested in scheduling training can call the program's direct line at 256.824.RIDE (7433) or email their request to RIDE@uah.edu.

For more details on RIDE, please contact:

Dr. Michael Anderson	Diana LaChance
256.824.RIDE (7433)	256.824.6878
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