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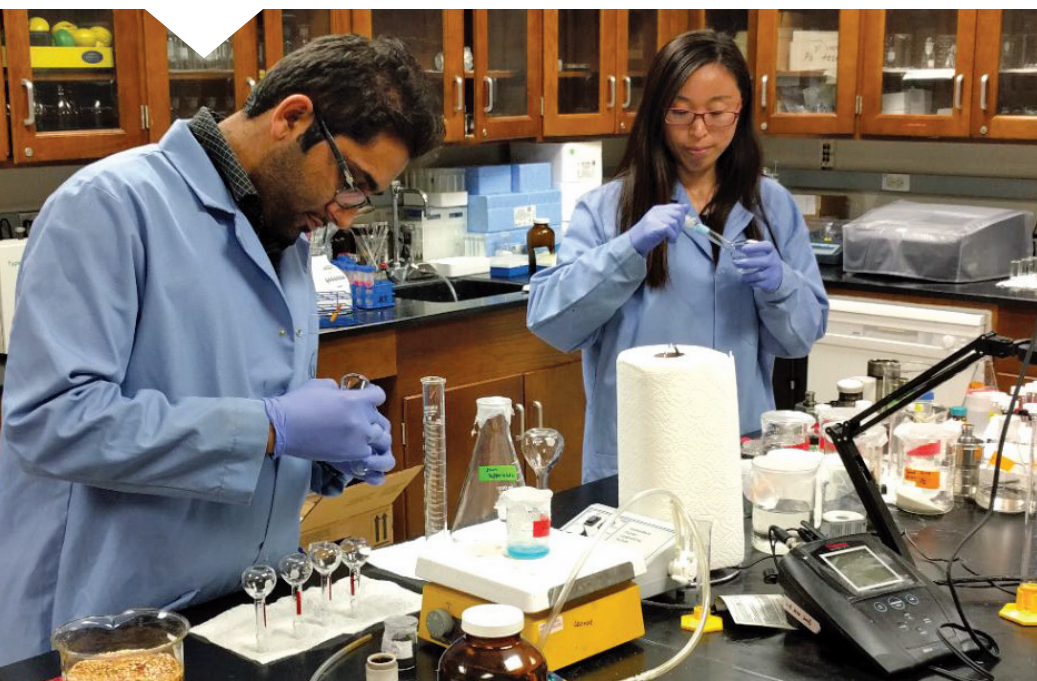
Promotions, publications,
and research grants

Greetings from the Department of Civil & Environmental Engineering (CEE) at UAH! I hope you enjoy reading our fall 2016 edition of CEE Pipeline. We are delighted to welcome Dr. Kirolos Haleem as a full-time lecturer. His area of expertise is transportation engineering. This past year, our faculty has been tremendously successful in securing new contracts and grants. These include new awards from the Alabama Department of Transportation (Anderson, Wu, and Zhou) and the National Science Foundation (Wu and Zhou). We are also fortunate to have attracted some high-quality graduate students to work with our faculty. Our ASCE student organization is busy working toward the Concrete Canoe and Steel Bridge competition to be held in Boca Raton, FL in March 2017. You can learn more about our student and faculty accomplishments in this newsletter.

Undergraduate enrollment in the College of Engineering increased by 13.4% since fall of 2015. In the CEE department, our enrollment is 152 and 24 at the undergraduate and graduate levels, representing a modest increase of 7.7% at the undergraduate level and nearly a flat enrollment in the graduate program. The search for a department chair continues through 2016-2017, and it is my hope that we will be successful this year. Our Civil Engineering degree program was formally reaccredited by ABET in August of 2016. Several alumni and members of our Industrial Advisory Board played a vital role in enabling us to achieve reaccreditation. We are truly grateful for their continued interest and support of the department.

Sincerely,

Shankar Mahalingam
Interim Chair and Dean



Environmental Engineering Laboratory

by Dr. Tingting Wu

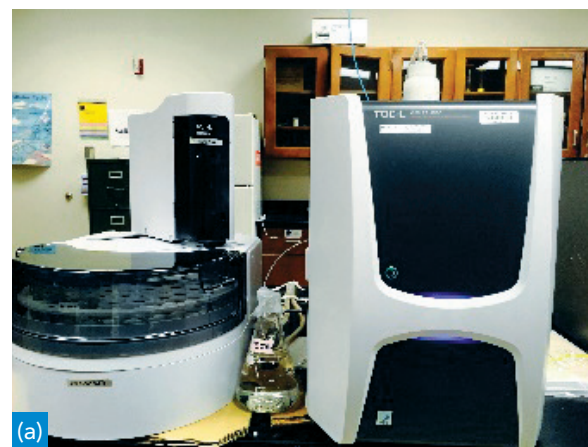
At the Environmental Engineering Lab, we are interested in sustainable water/wastewater treatment and reuse. Currently we focus on physical/chemical methods such as advanced oxidation processes (AOPs), electrochemical processes, and adsorption, etc. Our research is funded by the National Science Foundation (NSF), the Alabama Department of Transportation (ALDOT), and UAH.

We utilize a suite of analysis tools to examine the water quality and evaluate the process performance. Our lab is equipped for environmental engineering treatment process research and development, including water chemical analysis and microbiological studies. Equipment available to use includes a Milli-Q® Direct 16 Water Purification System, incubators, laboratory oven, box /tube furnace, a Phipps & Bird jar test apparatus, COD reactors, a microscope, water chemistry meters, analytical balances, and:

- ▶ Dionex ICS-1600 with auto sampler and RFIC systems: The ICS instrument has been newly upgraded with RFIC systems, which add the eluent-generation technology and gradient capabilities to previous isocratic system.
- ▶ Shimadzu TOC-LCPH with auto sampler designed for analysis of organic carbon in various water matrices, utilizing Platinum catalyst, 680°C combustion technique.
- ▶ HACH DR 6000 UV-VIS Spectrophotometer with RFID Technology, offering high-speed wavelength scanning across the UV and Visible Spectrum wavelength range of 190 to 1100 nm.

We also collaborated with the UAH Department of Chemistry and acquired a state-of-the-art LC-MS-MS system (HPLC/Hybrid Ion Trap-Orbitrap Mass Spectrometer) that allows us to identify and quantify trace-level emerging contaminants (pharmaceuticals, pesticides, personal care products, etc.) in water.

For more details contact Dr. Tingting Wu, 256-824-6423, tingting.wu@uah.edu.



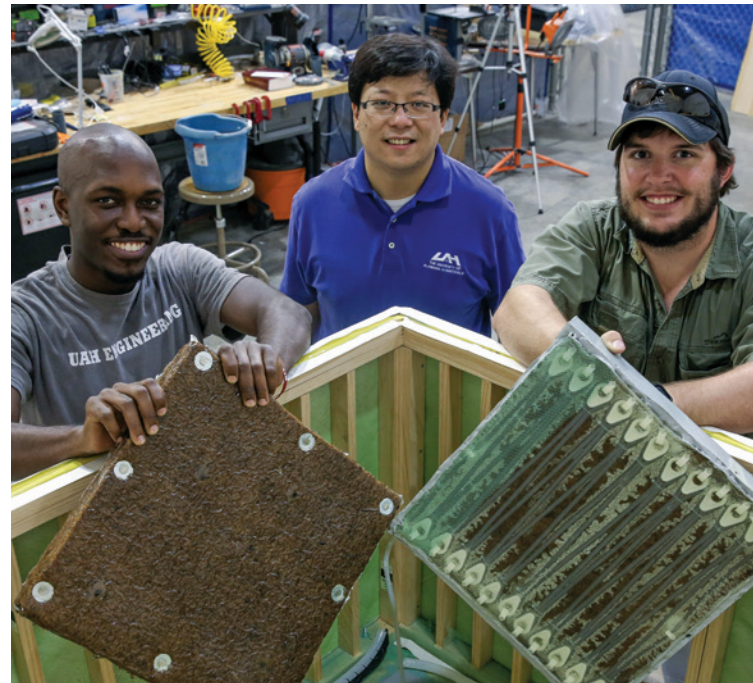
▲ Experimental Setup:

(a) TOC analyzer; (b) Tube furnace;
(c) DI system.

Structural Hazard Mitigation & Intelligent Materials (SHM&IM) Laboratory

by Dr. Hongyu Zhou

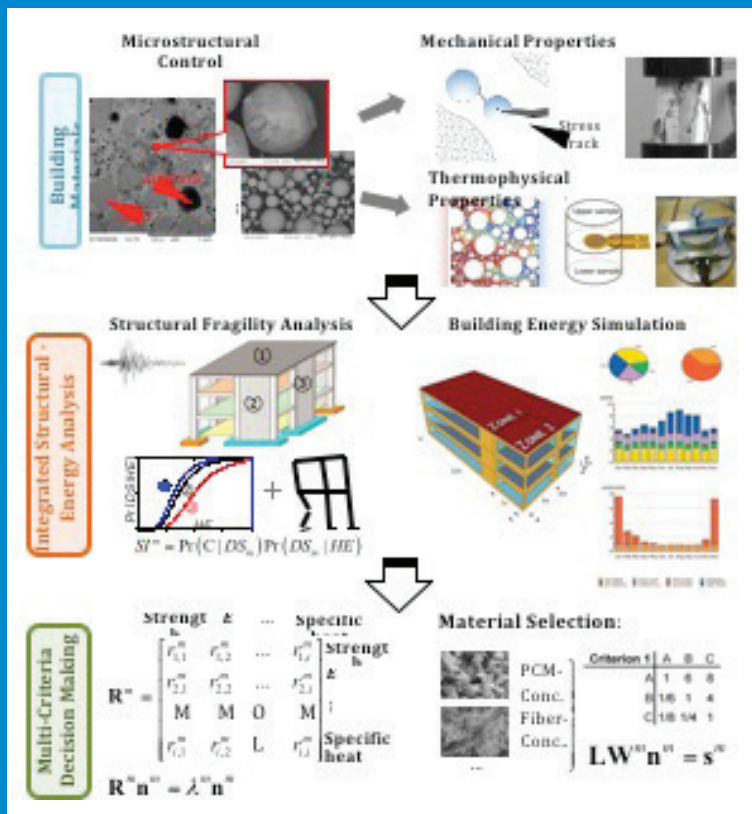
The Structural Hazard Mitigation & Intelligent Materials (SHM&IM) Laboratory at UAH was established by civil and environmental engineering assistant professor Dr. Hongyu Zhou and his students. The primary mission is to advocate for the holistic design and sustainable construction of buildings and other built environments by synergistically considering their architectural forms, building materials, and energy subsystems as an integrated entirety. Current research thrust areas include (1) methods for integrating structures and energetic subsystems and design processes; (2) emerging “smart” and “low embodied-carbon” materials and their infrastructural applications; and (3) data-informed structural condition assessments and monitoring. The facility features a self-reacting loading frame with interior test space of 18 ft (length) by 8 ft (width) by 16 ft (height), two MTS-810 servo-hydraulic university test systems with 110-kip and 22-kip load capacities, an MTS Insight electromechanical test system, and full-function infrastructural material synthesis and characterization laboratory housing equipment including the Hotdisk TPS Thermal Constant Analyzer, Hitachi Scanning Electron Microscope, and more.



SELECTED RESEARCH

The building sector consumes more than 40% of energy worldwide, where the two most significant fractions are the embodied energy in the form of building materials and the operational energy for space heating/cooling and lighting. Currently, practices in the architectural, engineering, and construction (AEC) industry follows a point-based process where the primary focuses of structural design are not tied in with other aspects of building performance (e.g., energy efficiency).

This research led by Dr. Hongyu Zhou at the Department of Civil & Environmental Engineering pursues energy solutions for building systems by rethinking the role of a building's structural system in its life-cycle energy strategy. The team is working on exploring the linkage between mechanical and thermophysical properties of building materials and components, imbuing building structure with a more poignant role: it serves both as the primary load-bearing and thermal system. The study will lead to a new paradigm of building design that brings together the structural and energy design processes, and holistically utilizes building materials toward hazard resilience and energy efficiency.





Concrete Canoe

by Michele Rule

We are getting ready for the Concrete Canoe competition by making our mold for the 2017 Regional Competition during spring break. The competition will consist of not only making or designing the boat but also racing the boat. Our team is involved in practicing on the UAH pond to get ready for the three different types of races. The canoe will have to be fast enough but also be able to turn with not only two people paddling but also four people paddling in the boat. Our hull design is actually going to combine two of our previous designs to make the very best canoe that we hope will head to nationals in 2017. We welcome any student engineer who is willing to help out and learn.

For more details on this student organization contact Nicholas Chiaradia, President ASCE, uah.asce@gmail.com.



RIDE Simulator for Driver Training

by Dr. Michael Anderson

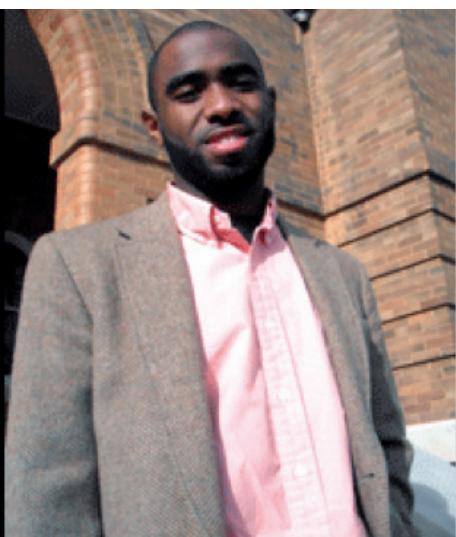
The RIDE Simulator was used in Alabama to train rural public transportation bus drivers and drivers associated with the transportation of elderly and disabled passengers during the summer and fall of 2016. Six individual training sessions were held around the state (Birmingham, Guntersville, Mobile, Montgomery, and Troy). The participants in the training underwent a defensive-driving session that included discussion of driving practices and supplemental drives on the simulators to enhance the instruction. Future training is scheduled and will incorporate close-quarter maneuvering in addition to defensive driving.

For more details on this research please contact
Dr. Michael Anderson, 256-824-5028, andersmd@uah.edu.



2015 Civil Engineering Outstanding Undergraduate Student: Brent Fletcher

Brent Fletcher, a senior from Vancouver, BC, Canada, serves as the team captain for the UAH hockey team. He is enrolled in the Joint Undergraduate and Masters Program (JUMP), and he currently works for a local aerospace company performing debris impact simulation and analysis. After his graduation in May 2017, Brent is planning to get married. He plans to pursue his master's degree in civil engineering at UAH. Brent says, "It was a tremendous honor to have received this recognition, and I would like to thank the excellent UAH professors who nominated me and have been great mentors to me."



Civil Engineering Alumni: Nehemiah J. Mabry, Ph.D.

Nehemiah graduated from the UAH CEE Department with B.S. (2009) and M.S. (2011) degrees in civil (structural) engineering. After departing from UAH, he went on to earn a doctorate degree in structural engineering and Mechanics from North Carolina State University (2015). Currently, he works as a bridge design engineer at Simpson Engineers & Associates in Cary, NC. Nehemiah is also the founder and president of STEMedia.org, a digital media company that provides creative and inspirational content for the science, technology, engineering, and math (STEM) community. He was the national grand prize winner of the 2012 Engineering STAY WITH IT video contest sponsored by Intel, Facebook, and MTV. More recently, he was selected as a finalist in the National Academy of Engineering's E4U3 Mega Engineering Contest. As a practicing engineer, Nehemiah enjoys sharing his knowledge and experience with aspiring students everywhere.

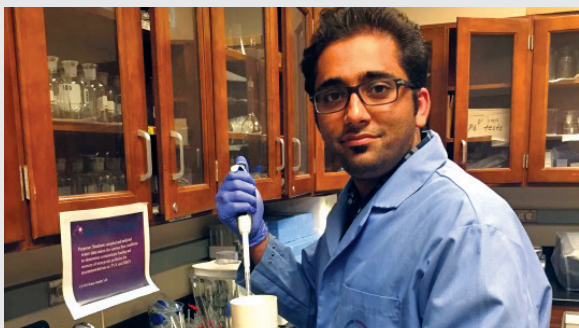
Bridge Team

by Sterling Riether

The UAH Steel Bridge Team competed in the Southeast Regional Competition for the third time in a row in March of 2016, and had an overall solid bridge design entering the competition. The main goal for the year was to place in the top four in order to qualify for the national competition. Although that goal was not achieved, the club saw great improvement in the fabrication quality and sees great hope for the future. The team is now looking to improve their bridge score and connection members in order to compete with the top schools in the Southeast Region. The club is looking forward to the challenge and the upcoming competition.



For more information, visit us at www.uah-asce.com or follow us on Facebook at www.facebook.com/groups/uah.asce.



AMIR AHMADI
Ph.D. Student

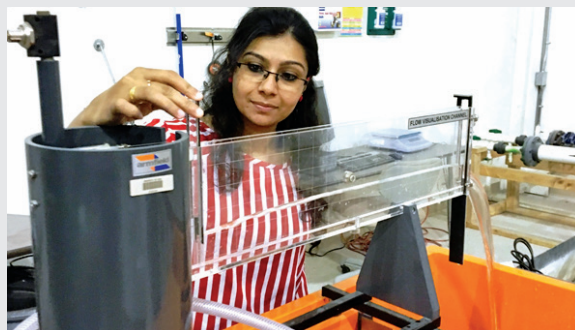
Amir is a graduate student in the CEE Department who earned his bachelor's degree (2012) and master's degree (2014) in water engineering from Shiraz University (Iran). During the pursuit of his M.S., he worked as a researcher at the Environmental Research and Sustainable Development Center of Shiraz University for three years. Amir has participated in many environmental projects such as water and wastewater treatment, solid waste management, hazardous waste management, and flood control of subway systems. His M.S. thesis topic was the design and optimization of domestic and industrial wastewater treatment with a combination of anaerobic and aerobic systems (for on-site treatment), which is a government-supported project in Iran. Amir is determined to pursue his education at higher levels as a Ph.D. student in the area of environmental engineering. Amir intends to find better solutions for controlling environmental problems and found UAH to be the best institution to pursue such an ambitious goal. Currently, Amir works as a graduate research assistant/graduate teaching assistant with Dr. Tingting Wu, researching and developing new technologies for water and wastewater treatment and disinfection.



DOMINIC HANNA
Ph.D. Student

Dominic L. Hanna is a graduate research assistant in the Department of CEE. He is working toward a master's degree in civil engineering with a focus in structural engineering.

Dominic is currently working on a research project sponsored by the Alabama Department of Transportation (ALDOT) utilizing self-centering connections to mitigate wind and truck collision induced damage on traffic support structures. This innovative strategy will provide an economic yet effective means to protect signage structures against wind storms and vehicle collisions by engaging pre-stressing effects and low-cost sacrificial parts in the connection design. The project will significantly reduce the maintenance and repair costs. Dominic is working with Dr. Hongyu Zhou, and he is a member of the UAH Structural Hazard Mitigation and Intelligent Materials (SHM&IM) laboratory. Besides his main research focus in resilience transportation infrastructures, he occasionally participates in research in emerging infrastructural materials.



POOJA PARVATHY PREETHA
Ph.D. Student

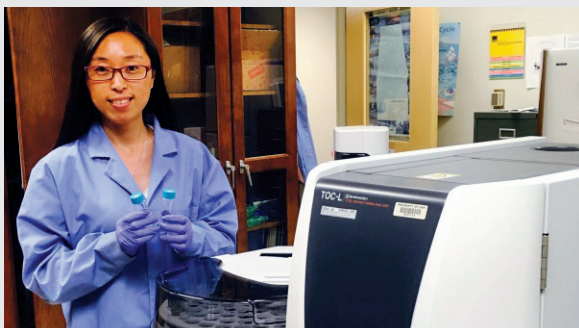
Pooja is a graduate student in the CEE Department. She earned her bachelors in civil engineering from the College of Engineering, Trivandrum, India, in 2011, and masters from the Indian Institute of Technology, Madras, in 2013. Prior to joining UAH, she worked as an assistant projects manager at the Jones Lang Lasalle firm in India on construction management projects. After three years of challenging and rewarding learning experiences in a dynamic work environment, she decided to pursue her real goal—introducing something novel to the world with a good engineering sense that is born from the foundation of strong technical knowledge and innovation. This dream brought her to pursue a Ph.D. degree at UAH. Pooja is currently working as a graduate research assistant/graduate teaching assistant with Dr. Ashraf Al-Hamdan. Pooja is working on climate change studies and its impact on the water resources, quality control and sustainable management practices for the environment.



GUILLERMO I. REYES

M.S.E. Student

Guillermo is a graduate student in the CEE Department. He received his bachelor's degree in civil engineering from UAH in 2014. Prior to beginning his graduate studies, he worked as an engineer intern for two years at the Huntsville-based firm Johnson & Associates (J&A). J&A provides civil and transportation engineering services as well as land surveying. After gaining valuable experience, he decided to go back to school to pursue a master's degree under Dr. Michael Anderson as a graduate research assistant. He is currently supporting a research team working on performing statistical crash analysis comparisons for both wet and dry pavement driving conditions in Alabama for the Alabama Department of Transportation.



WENWEN YANG

M.S.E. Student

Wenwen was born in QiQiHaer in the HeiLongJiang province of China. She received her bachelor's degree in macromolecule and material engineering from the East China Jiaotong University in 2010. From 2010 to 2015, Wenwen worked at the Institute of Chemistry, Chinese Academy of Sciences (IC-CAS). Her research at the ICCAS was on the mixed-valence system (including transition-metal compounds and coordination metallopolymer), which bridges the traditional fields of organic and inorganic chemistry. She is currently a graduate student and working with Dr. Wu. Her current research focuses on advanced oxidation methods for water and wastewater treatment.

Student Graduate Projects and Dissertations

Eman Alhamdan, 2016

Non-Thesis Title: Synergistic Integration of Photocatalysis and Ozonation for Advanced Water/Wastewater Treatment: Preliminary Study (M.S.E.)
Advisor: T. Wu

Mahbub Hasan, 2015

Non-Thesis Title: Prediction of Rainfall Using Fuzzy Inference Modeling (M.S.E.)
Advisor: A. Al-Hamdan

Sumalatha Kesavareddy, 2016

Thesis Title: Analysis of Crashes at Signalized and Stop-controlled Intersections in Urban and Rural Areas (Ph.D.)
Advisor: M. Anderson

Tahmina Khan, 2016

Thesis Title: Promoting Transportation Sustainability (Ph.D.)
Advisor: M. Anderson

Jaehoon Kim, 2016

Thesis Title: Estimating Impact of the Reshoring Phenomenon on the U.S. Freight Transport and Network (Ph.D.)
Advisor: M. Anderson

Sasan Parniani, 2016

Thesis Title: Fatigue Performance of RC Beams Strengthened with a Polyurea Coating System (Ph.D.)
Advisor: A. Al-Hamdan

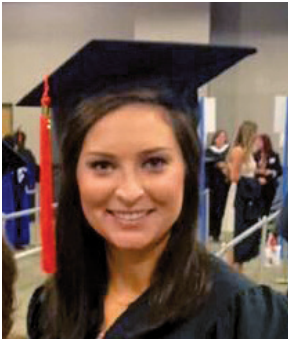
Daniel Saint, 2016

Non-Thesis Title: Correlation Analysis of Parameters at Browns Ferry Nuclear Plant (M.S.E.)
Advisor: J. Cruise

Sara Vahid, 2015

Non-Thesis Title: Numerical Investigation of Steel Self-Centering Coupled Beam System as Replacement for Steel Plate Shear Walls (M.S.E.)
Advisor: M. Anderson

Promotions



BRITTNEY LITTLE, joined the College of Engineering as the new laboratory technician overseeing both the CEE and Chemical and Materials Engineering (CME) departments. She is a recent graduate of UAH with a Bachelor's of Science in chemical engineering. Ms. Little will assist the department by keeping inventory of materials, maintaining the laboratory equipment, and ensuring that all safety protocol is met. She will also assist our faculty members with department audits. In her spare time she enjoys reading and yoga. Ms. Little is an active member of Shoals Yoga and is currently working toward obtaining her yoga teacher certification.



CHRISTINE G. ROBINSON, PE, began teaching as a part-time faculty member in the spring of 2006 and says she's enjoyed every class ever since. Ms. Robinson taught Water Quality Process Control for a few years prior to Dr. Wu's arrival and is now in her fifth year as the instructor for Civil Engineering Senior Design (CE498 and CE499). The senior design classes are a challenge to teach because they are new and different each year, with projects that push the students to think beyond the classroom and prepare them for work after college. She credits her experience as a city and utility engineer with providing her the breadth of knowledge and network necessary to lead the Senior Design course. When she's not teaching, Ms. Robinson works as a consultant in the North Alabama region, focusing mostly on water and wastewater projects. Currently, she is designing a solids separation process for an acidic industrial wastewater where polymer solids created in the process of carbon fiber manufacturing need to be removed to improve the efficacy of downstream on-site biological treatment. The daughter of an environmental engineer who grew up visiting treatment plants on family vacations, Ms. Robinson is passionate about the difference that civil engineers can make in the world and enjoys working with tomorrow's leaders.

ALAN CLEMENTS, prior to graduating from the University of Alabama in 1988 with a civil engineering degree, worked on the survey crew for G.W. Jones and Sons Consulting Engineers. During this time, he realized how much he enjoyed surveying and working outside. These two factors were the most influential in his decision to pursue a degree in civil engineering. After his first year of college, Alan transferred to the University of Alabama where he had the opportunity to teach the surveying lab for the Civil Engineering Department. Since those early days, his employment has been centered on transportation engineering. While working as a transportation engineer, he found that he was able to work closely with the surveying operations, where his career had begun. The opportunity to teach surveying at UAH was a surprise by my mentor and close friend Mr. Shelby Aston. Shelby Aston not only taught the UAH surveying class for the past 35 years, but he also taught Alan's first surveying class. The lessons that Alan learned from Shelby are the same lessons that he teaches our surveying students — "There is no such thing as a perfect measurement." All measurements have errors and it is the job of the surveyor to consider all evidence prior to staking boundary points that may disrupt the enjoyed peace of property owners. Alan says he owes most of his success to the lessons Shelby taught him, and he hopes to inspire his students in the same way.





DR. KIROLOS HALEEM joined the CEE Department as lecturer. Kirolos received his master's and Ph.D. degrees in civil (transportation) engineering from the University of Central Florida in 2007 and 2009, respectively. He has more than 10 years of experience in transportation engineering. His areas of expertise include traffic safety analysis, application of statistical models and data mining techniques in transportation data analysis, traffic operations, safety at highway-railroad grade crossings, and intelligent transportation systems (ITS). He worked for more than four years as a research associate at Florida International University in Miami, FL, where he led and conducted numerous transportation research projects sponsored by the Florida Department of Transportation and the USDOT, and supervised Ph.D. and M.S. students. Kirolos also brings industrial experience working at AgileAssets Inc. and the West Virginia Department of Transportation.

Kirolos possesses experience in University Transportation Center (UTC) research projects and funding. For example, he served as a co-PI in a collaborative UTC project with the University of Alabama at Birmingham, named "Digital Advertising Billboards and Driver Distraction," sponsored by the Georgia Tech UTC. An empirical study was performed to investigate driver distraction from digital billboards using historical crash data and a driving simulator.

Kirolos also possesses multidisciplinary experience through his collaboration with researchers in diverse research fields, such as computer science, human factors & occupational therapy, and structural engineering. For example, he served as a co-PI in an FDOT-sponsored project and collaborated with researchers in computer science to introduce the fractal or self-similarity theory in analyzing transportation data for the first time in Florida.

Kirolos is teaching the following courses at UAH: CE/MAE 271(Statics), MAE 272 (Dynamics), CE 380/L (Civil Engineering Materials & Laboratory), CE 484/584 (Steel Design), and CE 487/587 (Bridge Design).

Publications

Ko, S., Kim, J., Anderson, M.D., Mohammadian, A. K.
"Distribution Changes of Containerized Freights into the U.S. by Maritime Network Capacity Increase," *International Journal of Traffic and Transportation Engineering*, Vol. 5 No. 3, 2016, pp. 73-81. doi: 10.5923/j.ijtte.20160503.03.

Doustmohammadi, M; Anderson, M.D.
"Developing Direct Demand AADT Forecasting Models for Small and Medium Sized Urban Communities," *International Journal of Traffic and Transportation Engineering*, Vol. 5 No. 2, 2016, pp. 27-31. doi: 10.5923/j.ijtte.20160502.01.

Doustmohammadi, E., Sisiopiku, V.P., Anderson, M.D., Doustmohammadi, M., Sullivan, A.
"Comparison of Freight Demand Forecasting Models," *International Journal of Traffic and Transportation Engineering*, Vol. 5 No. 1, 2016, pp. 19-26. doi: 10.5923/j.ijtte.20160501.03.

Khan, T. and Anderson, M.D.
"Evaluating the Application of Diverging Diamond Interchange in Athens, AL," *International Journal for Traffic and Transportation Engineering*, Vol 6(1). March 2016.

Englehardt, J., Wu, T., Bloetscher, F., Deng, Y., du Pisani, P., Eilert, S., Elmir, S., Guo, T., Jacangelo, J., LeChevallier, M., Leverenz, H., Mancha, E., Plater-Zyberk, E., Sheikh, B., Steinle-Darling, E., and Tchobanoglous, G.
"Net-Zero Water Management: Achieving Energy-Positive Municipal Water Supply," *Environmental Science: Water Research & Technology*, 2, 250-260, 2016

Shen Z., and Zhou H.,
"Carbon fiber-based structural electric capacitors: coupled mechanical-electrical behavior and effect of interlaminar damage," *Proceeding 2016 ASCE Earth and Space Conference Proc.*, Orlando, FL, April 11 – 15, 2016.

Zhou H., Brooks A.L., Shen Z., and Hanna D.
"Monolithic "unibody" light-frame structures: an integrated solution for multi-hazard mitigation and building energy enhancement," *Proceeding ASCE Geotechnical and Structural Congress*, Phoenix, AZ, April 11 – 15, 2016: pp. 212-22, doi: 10.1061/9780784479742.018



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