This fall, more than 750 freshmen entered the College of Engineering and marked 100 years of excellence in engineering education. What began a century ago with 28 students has flourished into an undergraduate class of nearly 2,800.

Along with the College’s 100th class, we welcomed 13 new faculty—all experts in their respective fields. The new instructors bring a wide range of research experiences and join our excellent faculty who have once again increased research activity within the College. I invite you to read more about our new faculty and exciting research within the pages of this newsletter.

As the fall semester comes to a close, we’re preparing to celebrate the College’s major milestone in May, and we hope you’ll mark your calendars now for the Centennial Gala on Thursday, May 22, 2014. As always, thank you for your continued support of our College.

Dr. George K. Haritos
Dean

We’re reflecting on the College’s history and preparing for the next 100 years of engineering excellence.

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The College of Engineering welcomed its 100th class to campus at the start of the Fall 2013 semester. More than 750 incoming freshmen are part of the College’s largest undergraduate class to date—nearly 2,800 students!

Calling all alumni! Help us celebrate.

We’re looking for stories about your Akron Engineering Experience. Send an email to engineering@uakron.edu and tell us about:

• Your favorite professors
• Your best memories
• Where you’ve taken your engineering degree
• How UA has contributed to your success
• What you wish your younger self would have known or done differently

SAVE THE DATE

COLLEGE OF ENGINEERING CENTENNIAL GALA
Please plan to join us as we celebrate a century of excellence in engineering education at The University of Akron on May 22, 2014. Invitation to follow.

MAY 22 2014
STUDENT NEWS

Zips Racing: Team places in world’s top 10

After competing with some of the more than 500 Formula SAE collegiate race teams internationally, the Zips Racing Team emerged among the world’s top 10, the nation’s top five and as the Midwest’s No. 1. SAEl International, formerly known as the Society for Automotive Engineers, governs the worldwide Formula SAE program and praised UA’s students for their well-rounded skills that it believes will help them in their future careers.

‘Akron gets it’

“In addition to this competition being about engineering design, it also focuses on developing business soft skills like project management and Akron gets it. Hands-on engineering experience coupled with learned soft skills provides team members of UA’s FSAE team with a leg up on other job candidates after graduation. That’s what our program is designed to do — bridge education and career,” says Kaley Zundel, SAE International collegiate program manager.

World ranking

The world ranking for the team is based on the results of several competitions and events, including the Formula Student Germany – Pure Combustion Event. The ZR13 placed sixth overall for on-track performance categories such as acceleration, autocross, skid-pad and endurance; and off-track for cost, design and marketing.

Cars in Formula SAE racing are judged on such factors as cost, innovation, acceleration, and design. Students spend thousands of hours working on the vehicles and in the process learn skills in aerodynamics, chassis construction and mechanical engineering as well as business development and fund raising.

“[Akron] continues to increase our program’s value yearly as they continue to take on the challenge of designing, fabricating and competing...”

FORMULA SAE® 2013 RESULTS

Michigan: 1st place in endurance challenge, 3rd overall
Germany: 1st place in skid pad, 6th overall
World Ranking: 8th place

ECE seniors are headed to Cornell Cup USA at Disney World!

Four seniors in the Computer and Electrical Engineering Department have their sights set on a trip to Florida in May to compete in the third annual Cornell Cup USA, presented by Intel. The college-level embedded design competition was created to empower student teams to become the inventors of the newest innovative applications of embedded technology.

The students, Dylan Fashbaugh, William Lorence, Kyle Lepley, and Brian Lesnak, based their proposal for the competition on the work they are completing as part of their senior capstone project. The UA team will compete against approximately 30 other teams.

Their project is a portable variable digital audio processor that could change the way live sound and instrument effects are controlled. The students aim to develop a system that solves many of the issues experienced by musicians when playing live, including a lack of stage presence due to being tethered by a cable to an effects system and the inability to recreate sounds that were made in the studio.

The system also combines this new functionality with a robust digital audio workstation that can be used to generate completely new sounds based on the live audio input signal.

As finalists, the team will receive $1,500 in project support and the opportunity to win up to $10,000 at the competition in May.

ME Ph.D. candidates receive best paper awards at conferences

Nick Shaffer, Ph.D. student in mechanical engineering, received 1st place in the Fluid Flow and Imaging Division Ph.D. paper competition at the 2013 ASME Summer Bioengineering Conference.

“There were 180 total abstracts submitted for this competition, and six divisions among those, so it was quite competitive,” says his advisor, Dr. Francis Loth.

The award was based on his paper and oral presentation.

Yanfeng Lu, also a Ph.D. student in mechanical engineering, received the Best Paper Award at the 5th International Conference on Manufacturing, Design and Tribology held in Busan, Korea in 2013.

The title of his winning paper is “Direct-Write/Cure Conductive Polymer Nanocomposites for 3D Structural Electronics,” and the authors are Yanfeng Lu, Morteza Vatani (also an ME Ph.D. student), and Dr. Jae-Won Choi, assistant professor of mechanical engineering.

Nick Shaffer (center) of the University of Akron, won the 2013 ASME Summer Bioengineering Conference Best Paper Award for work on an active sound system that could solve many of the problems musicians face when playing live.

Yanfeng Lu, Ph.D. student in mechanical engineering, won the 5th International Conference on Manufacturing, Design and Tribology Best Paper Award for work on 3D structural electronics.
In October, a group from UA’s College of Engineering attended the annual Society of Women Engineers (SWE) conference in Baltimore. With nearly 7,000 attendees, Akron’s SWE Chapter president Katy Dzurisin said the event lived up to this year’s theme: “Make Connections. Make History.”

“It’s a great way to meet SWE members from other parts of the country and world,” says Dzurisin. “We also had the opportunity to attend the second largest career fair for engineers in the country.”

Dr. Mary C. Verstraete, associate professor of biomedical engineering, presented a talk entitled “YAY! I was awarded tenure! NOW WHAT?” and also spoke on a panel “Opportunities in Academic Leadership: Preparation & Advancement” at the conference.

“Programs like these expose young girls to science and engineering and help them see the field as a viable career path,” says Cressman.

Participants constructed digital cameras by carefully following instructions, built submarines and designed a rescue strategy during the Princess Rescue Workshop — an exercise in engineering during which the girls worked to devise any number of rescue devices, from parachutes to zip lines to chutes — to prevent the princesses from crash landings. The girls then discussed concepts like balance and friction that they considered in their designs.

“Programs like these expose young girls to science and engineering and help them see the field as a viable career path,” says Cressman.

Senior in mechanical engineering learn from Tuskegee Airman

“I would rather meet Roy than LeBron James,” says Andrew Bower, a University of Akron senior double-majoring in aerospace engineering and applied mathematics. Bower is referring to Tuskegee Airman Roy Richardson who visited UA last week to address a mechanical engineering senior seminar class.

“I have the highest respect for WWII veterans and in particular for men like Roy who rose above the racial bigotry in order to serve his country. I can’t thank these guys enough for the service they gave us back in the ’40s,” says Bower of Akron, who will become one of UA’s first four graduates to earn a bachelor’s degree in aerospace systems engineering next May. UA is the only institution in the United States that offers a bachelor’s degree with systems content at the undergraduate level.

Bower was one of several students who came to hear Richardson, 83, discuss his experiences as a Tuskegee Airman.

UA students attend national SWE Conference in Baltimore

“Richardson is among the first African-American military aviators in the U.S. armed forces and next May, Bower will be among the university’s first four graduates with a bachelor’s degree in aerospace systems engineering.

Andrew Bower (left) with Tuskegee Airman Roy Richardson

Inquire! Innovate! Invent! attracts 120+ girls

More than 100 girls in grades 7-12 attended “Inquire! Innovate! Invent!” presented by The University of Akron Women in Engineering program on Saturday, November 16. The event is designed to teach girls about the impact of innovations made by women and inspire them to become inventors, too.

Women in Engineering Director Heidi Cressman orchestrated the program, which featured interactive and innovative workshops.

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Alumnus invests in scholarships for engineering students

Chemical engineering student Melissa Paydo is thankful for the generosity of College of Engineering alumnus Larry Allen, who is investing in what he calls “human potential.” Paydo is a third-year engineering student also minoring in dance.

“I believe this is the best investment I can make in the future of the country,” says Allen. “I would hate to see students not receive the education they need because of financial limitations.”

The Larry W. Allen Scholarship for Engineering Excellence was established in 2009 by Mr. Larry W. and Susan Allen to assist deserving engineering students as they pursue an undergraduate degree from The University of Akron.

Chemical engineering student Melissa Paydo

Students followed instructions to build digital cameras capable of taking 3-D pictures.

UA’s Lunabotics team led participants in a service project by teaching the girls to solder circuits for bug bot kits that will be used to teach younger girls in future science and engineering events.

The event, sponsored by AlCoA, also included a discussion with a panel that included professional engineers, patent attorneys and inventors.

Seniors in mechanical engineering learn from Tuskegee Airman

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Bower was one of several students who came to hear Richardson, 83, discuss his experiences as a Tuskegee Airman. The Tuskegee Airmen were the first African-American pilots who fought in World War II. Bower took a front-row seat beside Richardson, before the pilot was introduced to the audience by Richard Enty, executive director of METRO Regional Transit Authority. Enty worked with Jerry Drummond, UA professor emeritus of mechanical engineering, to arrange the presentation.

Richardson is among the first African-American military aviators in the U.S. armed forces and next May, Bower will be among the university’s first four graduates with a bachelor’s degree in aerospace systems engineering.

Dr. Mary C. Verstraete, associate professor and associate chair for biomedical engineering (undergraduate), and Mrs. Heidi Cressman, director of the Women in Engineering Program, traveled to the SWE conference with the largest group of UA students to date.

Larry and Susan Allen pose with Zippy during a recent trip to Machu Picchu.
Tavana awarded NIH grant for advancing 3-D tumor models for anticancer drug testing

The National Institutes of Health (NIH) is supporting the work of Dr. Hossein Tavana, assistant professor of biomedical engineering, who may hold the key to improving the effectiveness of cancer treatments. The agency has awarded UA’s Hossein Tavana a two-year, $511,000 grant to fund his ongoing efforts to improve the testing and effectiveness of anticancer drugs.

Tavana has developed a method to generate 3-D cultures of cancer cells (spheroids) that better model tumors in the body. These improved models have the potential to dramatically improve the screening and discovery of effective chemotherapeutics, Tavana says.

In contrast to the traditional 2-D culture of cancer cells, in which a thin layer of cells is treated on a flat, plastic dish, a 3-D culture of solid, clustered cells allows researchers to test chemotherapeutic drugs on tumor models that better mimic the complex environment of cancer cells in the body. This method makes drug screening and discovery more efficient and cost-effective, Tavana explains.

He points out that pharmaceutical companies spend an enormous amount of time and money on testing thousands of compounds on 2-D “monolayer cultures” without being able to adequately predict how the drugs will behave in the 3-D environment of the body.

A 384-well plate containing culture media. Cancer cells are immersed in the media, where they aggregate into spheroids.

In a 2-D culture, a small concentration of a drug can kill all of the cells,” Tavana says. “But that same drug might only penetrate the peripheral cells, and not the core, of a solid 3-D tumor in the body. So, if you are able to conduct those initial tests with a three-dimensional model that is a closer mimic of the actual tumor, then you would save a lot of time and money.”

Testing on 3-D models would allow researchers to determine with greater accuracy which drugs will best treat particular forms of cancer, Tavana says, eliminating the need to treat patients with a battery of drugs in the hope of finding something that works.

“What excited the NIH reviewers is that we are able to use a robot,” Tavana says. “One of the reasons drug companies are not moving toward using three-dimensional cultures is that existing 3-D culturing methods are manual and hard to perform.”

The robot, equipped with rows of pipettes, dispenses cancer cells into 384 small wells, or miniature test tubes, each of which contains a liquid that provides nutrients to the immersed cells, allowing them to aggregate as they would in the body, resulting in 384 physiologic tumor models.

“We are very excited that our research has been recognized by the NIH,” says Tavana, who last month received a separate, three-year, $310,000 grant from the National Science Foundation for his research on the microenvironment of stem cells.

“This R21 grant will help fully develop and validate our technology and catalyze our ongoing efforts in developing translational cancer technologies,” he says.

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“Cell lines are easy to handle and maintain,” Tavana says, “but over time they lose some of their physiologic characteristics due to frequent passaging in culture dishes. The advantage of using primary cells is that these cells have all their original characteristics and functions, and we will be able to elicit more physiologic response from them when treated with drug compounds.”

Dr. Hossein Tavana (center), is assisted in his research by graduate students Ehsan Atefi (left) and Stephanie Lemmo (right).

Graduate student Stephanie Lemmo manually loads the well plate. In practice, this is done by the robotic liquid handler.

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The College of Engineering has seen significant growth in research expenditures over the past five years. In 2008, research expenditure in the College was $4 million, and in 2013 that number grew to $16.6 million. During the same time period, the per-faculty research expenditure jumped from $66,000 per year to $207,000.
Human model-based adaptive control of a dexterous artificial hand

Dr. Erik Engeberg, assistant professor of mechanical engineering, has been awarded a grant from the National Science Foundation to explore different methods for people with upper limb amputation or congenital limb absence to control dexterous artificial hands with brain waves.

“When people move, or imagine moving their hands, characteristic electrical signatures are generated on top of the head that can be detected noninvasively,” says Engeberg. “The goal of this research is to develop biomedical signal processing techniques to enable this with a single, small recording electrode placed noninvasively on subjects’ heads.”

The recorded brain waves will be wirelessly transmitted to the artificial hand in real time. A top-level controller will be developed to interpret the intent of the test subjects while a low-level controller will be used to synchronize the dexterous grasp motions of the artificial hand. Algorithms will also be developed using tactile feedback from the fingertips to automatically prevent grasped objects from being accidentally dropped when they are transported or disturbed. Individuals with an upper limb amputation or absence will participate in a study to compare the newly developed artificial hand control techniques with brain waves to conventional control techniques with muscle signals during common tasks of daily life.

If successful, this research will result in a noninvasive and economical method to control a dexterous artificial hand with brain waves.

Oxygen-infused hydrogel may be what the doctor orders next

Dr. Nic Leipzig, assistant professor of chemical and biomolecular engineering, will continue the development of an innovative wound dressing with funding from the National Institutes of Health (NIH). The three-year grant will fund Leipzig’s creation and testing of a wound dressing that is able to support regenerative levels of oxygen to supplement— or even take the place of— current oxygen delivery therapies.

Oxygen plays an important role in the healing process, particularly in chronic, non-healing wounds that can become extremely problematic for patients with diabetes. In some cases, when oxygen levels are extremely low and the wound cannot properly heal, amputation may even be required. Leipzig and his team have an innovative solution: an injectable/moldable hydrogel that contains elevated levels of oxygen to improve short- and long-term skin healing.

Improving today’s medical solutions

Current oxygen delivery therapies are intermittent, inconvenient for the patient, and require access to expensive and specialized equipment such as a hyperbaric oxygen chamber. In contrast, Leipzig’s hydrogels can sustain elevated oxygen levels needed for healing for more than 24 hours, and potentially for up to five days. These hydrogels are easily formed into dressings with the potential to provide uniform, sustained oxygenation across the wound, improving outcomes for the patient.

As part of the NIH-funded research, the team of graduate, undergraduate and high school students will create and refine oxygen delivery hydrogels and conduct preclinical proof of concept studies to evaluate the safety and efficacy of the hydrogels in wound healing. The ability to supply oxygen from a convenient hydrogel dressing could transform chronic wound-healing while providing new tools for studying the role of oxygen in correcting other tissue injuries, disease or disorders.

UA Selected Member of US DOT University Transportation Center

The University of Akron is part of the consortium of universities recently awarded $2.6 million by the United States Department of Transportation to create one of 10 Regional University Transportation Centers (UTC). UA is part of the Region 5 UTC, which is led by the University of Minnesota and also includes the University of Illinois at Urbana-Champaign, Southern Illinois University and Western Michigan University. The consortium will focus on targeted research, education, and technology transfer aimed at determining and delivering the next wave of transportation safety improvements.

“Our approach allows us to treat transportation safety in an integrated fashion,” says Dr. William H. Schneider, associate professor of civil engineering. “Recognizing that transportation safety is not only about the physical network of roads, highways, and bike/pedestrian lanes—it is also about the behavior patterns of travelers.”

Led by Dr. Schneider, UA will provide hot spot analysis (HSA), a geospatial analysis tool, to identify risk areas for impaired driving based on existing locations of related arrests and crashes. The research will include working with police agencies to obtain arrest data and mapping areas of high risk. The goal is an initial increase in impaired driving arrests, which would lead to a long-term decrease in impaired-driving crashes, fatalities, and injuries by getting impaired drivers off our region’s roads.

FACULTY NEWS

Dr. Binienda receives high honor from ASCE

Dr. Wieslaw Binienda, civil engineering department chair and professor, earned the 2013 Richard R. Torrens Award for his outstanding editorial leadership and for contributions to the enhancement of the Journal of Aerospace Engineering. The journal, which will become bi-monthly in 2014 due to increased submissions, only accepted 32% of manuscripts for publication in 2013—a testament to its high quality.

The award is made in recognition of Richard R. Torrens’ distinguished service and honors volunteer journal editors who have made outstanding contributions to the ASCE journals’ program.

Electrical engineering professor, students plan international conference

Dr. George Giakos, professor of electrical and computer engineering, served as the General Chairman of the 2013 IEEE International Conference on Imaging Systems and Techniques, and Director of the IEEE International School on Imaging. Both events took place October 21-23, 2013 in Beijing, China.

Dr. Giakos’ students played a significant role in the organization and success of the events; included were Tanya Tanabhi, Xinyu Li, Suresh Aditi Desphande, Chaya Narayan, Tri Quang, and Bo Liu.
The College of Engineering welcomes new faculty

Rouzbeh Amini
Assistant Professor
Department of Biomedical Engineering

Yang Liu
Assistant Professor
Department of Biomedical Engineering

Honbo Cong
Assistant Professor
Department of Chemical & Biomolecular Engineering

Jiahua Zhu
Assistant Professor
Department of Chemical & Biomolecular Engineering

Juniang Tao
Assistant Professor
Department of Civil Engineering

Forrest Sheng Bao
Assistant Professor
Department of Electrical & Computer Engineering

Abbas Omar
Department Chair
Department of Electrical & Computer Engineering

Ryan Christopher Toonen
Assistant Professor
Department of Electrical & Computer Engineering

Yalin Dong
Assistant Professor
Department of Mechanical Engineering

Siamak Farhad
Assistant Professor
Department of Mechanical Engineering

Sergio Felicelli
Chair and Professor
Department of Mechanical Engineering

Nicholas Garafolo
Assistant Professor
Department of Mechanical Engineering

Chang Ye
Assistant Professor
Department of Mechanical Engineering

SAVE THE DATE!
Please plan to help us celebrate the rich history of the College of Engineering at the Centennial Gala on May 22, 2014. Formal invitation to follow.