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# illuminator

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## ODU engineers develop virtual reality tool for treating chest wall deformities

story and video by Keith Pierce

For people with sunken or protruding breastbones, surgery is not always an option. In most cases, the use of a brace or a suction cup for up to several hours a day is the preferred treatment. However, because both conditions are most common in children, getting them to use the devices often is an issue.

A team of students and faculty at Old Dominion University has developed a 3D scanning tool to track improvement of chest deformities that's so extraordinary it has attracted the attention of hospitals in Korea, China and France.

"I was surprised at the methods they have been using to measure patient progress," said Frederic McKenzie, professor and chair of the Department of Modeling, Simulation and Visualization Engineering (MSVE) in the Batten College of Engineering and Technology. "It's really just a ruler placed on the chest, which is not only very prone to error, but it's not very informative, especially to young patients."

The tool created by McKenzie's team is designed to provide a more accurate measurement of progress while improving patient compliance. It enables patients and parents to see chest improvement in a colorful, game-like 3D simulation.

"Our collaborators at Children's Hospital of the King's Daughters (CHKD) tell us that patients and parents just love this tool," McKenzie said. "Children especially love seeing the chest improvement in a virtual-reality way."

According to Dr. Robert Kelly, chief of surgery at CHKD, treatment of pectus excavatum (sunken chestbone) and pectus carinatum (an uncommon birth defect in which the breastbone protrudes abnormally) can take years.

"The treatment progress is slow, especially for a teenager," he said. "The scanner and software developed by the team at ODU have been very helpful in getting patients to stay the course because it provides a colorful 3D image that gives a much more accurate picture of progress. More importantly for us, the topographical map of the patient's chest provides a much better snapshot as to the severity of the condition, which lets us know if and when surgery is required."

Nahom Kidane, an MSVE Ph.D. student, said the project gives his love of simulation technology real meaning.

"Nowadays kids are so adept to the use of gaming devices, so we thought why not create a way for them to see their progress in 3D and actually motivate them to come back to the hospital to see their progress, and it's working," Kidane said.

McKenzie's team had already developed a simulation to help train doctors to perform a procedure that was developed in 1987 by Dr. Donald Nuss at CHKD for treating pectus excavatum. This minimally invasive procedure involves the insertion of a concave stainless steel bar under the sternum and is being used worldwide.

"Surgical simulation is a hot topic in medicine right now, which is why a few years ago we asked Dr. McKenzie for help developing a training tool for the Nuss procedure," Kelly said. "Along the way, we had also been working on these non-surgical treatments, which is when Dr. McKenzie agreed to develop a simulator for those procedures."



CHKD technician uses ODU 3D scanning device on patient, Dylan Theissen

Kelly and McKenzie recently wowed doctors from around the world when they presented the technology at a conference hosted by the Chest Wall International Group in Seoul, South Korea, in June.

"A simulator can be of great benefit if it provides realistic behavior and representation of the actual surgery," said Mohammad Obeid, associate professor of Modeling, Simulation and Visualization Engineering, a co-author of the technology. "Our instrument produces an objective gauge of a patient's physical improvement after undergoing treatments with realistic textures, as well as physical behaviors." engineering sophomore and team co-captain, Sarah Bohn. "What I have liked most about this is that I get kind of the full wrap of what engineering is."



Batten College of Engineering  
and Technology

# ALUMNI SPOTLIGHT: CLARENCE RAY

## Why former Duke Energy CEO gives back



See more in this brief video:



story and video  
by Keith Pierce

After serving as CEO for another Duke subsidiary, Duke Energy Generation Services, Ray retired from Duke in 2007. But he didn't stop there. He was lured by the Shaw Group, another major energy company, where he became CEO of the power division.

Ray attributes much of his success, as well as his ability to advance in his career, to the broad-based engineering knowledge he received at ODU.

"I've always felt that the education that I got at ODU played a significant role in my ability to do what I was able to do over my 44-year career. Having classes in electrical mechanical and civil engineering gave me a broad understanding of engineering, how to think in the context of all of those things."

Ray gives back to ODU in the form of an annual endowed scholarship for engineering students.

**M**ore than fifty years ago, 1970 Old Dominion University engineering graduate, Clarence Ray, took advantage of an offer he couldn't refuse – work for his father's auto repair business to pay for his first semester each year at ODU and each year his father would pay for the second semester.

"ODU was a perfect fit for me. We didn't have the money for me to go out of town to college. I lived right in the Norfolk area, so I commuted to school."

Spending too much time working for his father, however, caused his grades to suffer to the point of receiving an expulsion letter from the dean of engineering. That's when a dedicated faculty advisor, Fred Moreadith, stepped in. Seeing his potential, Moreadith made Ray another offer – "cut back your work hours at your father's shop and I'll do everything I can to convince the dean to reverse your expulsion." Ray agreed and the rest is history.

"I was so pleased that my faculty advisor had that much faith in me that I wanted to honor that by doing my very best," Ray said.

His very best might be an understatement. Ray went on to become a power player in the power industry, spending most of his nearly 45-year career at Duke Energy in North Carolina. His more than 36 years at Duke included serving as CEO for two Duke Energy subsidiaries, one being, Duke Fluor Daniel, a multi-billion dollar international engineering and construction partnership.

"Duke Fluor Daniel was put together to design and build power plants both here in the U.S. and internationally," Ray explained. "I started as vice president of engineering and then after about a year, I was vice president of projects and then became president and CEO. We grew the company from a four or five hundred million dollar revenue to between three and a half and four billion dollars in revenue."

"It's not a big scholarship, but it's appreciated," he says. "I get letters from the scholarship awardees, some short letters and some very long, all of them nice letters detailing their backgrounds and so forth, so that's been a really rewarding experience."

Ray describes the endowment process as simple and believes any alum can do it. "You don't have to start with a huge amount of money," he says. "A set amount of money, agree that you'll put this much in and do it year after year after year, and it grows over time. So you don't have to even be at the level where they would do a scholarship right away. You can start at a small level, let it grow and then the university will start issuing scholarships under that. The school manages the money very well."



Ray's 1970 yearbook photo

# FACULTY SPOTLIGHT: MEET THE NEW CHAIRS

## ENGINEERING TECHNOLOGY



**ISAAC FLORY**

story and photos by Keith Pierce

**ISAAC (IKE) FLORY, IV, PH.D.**, has been named chair of the Department of Engineering Technology (ET). Flory, who served as interim ET chair for just over one year, received his B.S., M.S. and Ph.D. degrees in Electrical Engineering from Virginia Tech in 1984, 1993 and 2008, respectively.

"I look forward to working with the department's faculty and staff, as well as college and university administrators, to maintain the high level of engineering technology education for which we have become known," Flory said. "My primary goals are to grow student enrollments and expand industry collaborations to afford our graduates the broadest spectrum of opportunities upon their entry into the workforce."

Flory has more than 17 years of experience in the lighting industry, serving in several positions within Hubbell Lighting Incorporated, including Chief Electrical Engineer, Manager of Electrical Engineering and Intellectual Property Coordinator.

A licensed Professional Engineer in the Commonwealth of Virginia, Flory has extensive experience in product development, testing and failure analysis. He has been awarded 25 United States Patents and has served on several committees involved in the creation of standards for the domestic lighting industry. His research areas include energy conversion, energy conservation and alternative energy sources. Since joining Old Dominion University, he has been the principal or co-principal

## CIVIL ENGINEERING



**SHERIF ISHAK**

investigator on research programs totaling over five hundred thousand dollars. He has published in both technical and educational journals, as well as a number of refereed conference proceedings. He teaches engineering technology courses in power systems, energy conversion, circuit analysis, analog and digital electronics, and technical analysis. In 2007, Flory received the Batten College of Engineering and Technology *Excellence in Teaching Award*.

"Engineering Technology is a dynamic and ever-changing field which must adapt to meet the needs of its practitioners, as well as those that they serve," he said. "The department's mission is to educate socially responsible and technically sound applied engineers ready to embrace the challenges of an expanding global economy. I am proud of the department faculty in terms of their commitment to excellence in teaching, coupled with their excellence in applied research and strong engagement with industry and community."

**SHERIF ISHAK, PH.D., PE**, a former professor and department chair at the University of Alabama in Huntsville (UAH), has been named chair of the Department of Civil and Environmental Engineering. Prior to UAH, Ishak served as a professor of civil engineering at Louisiana State University (LSU).

"I look forward to working with all constituents on advancing the education and research mission of the department, the college and the university," Ishak said. "My plan is to define an integrated research and education mission that promotes

curricular transformation and encourages early engagement of undergraduate students in research."

Ishak has more than 26 years of experience in the field of transportation engineering with emphasis on intelligent transportation systems, traffic operation and control, traffic flow modeling and simulation, traffic safety, human factors and driving behavior, artificial intelligence and advanced computing applications in transportation, and the new emerging area of connected and automated vehicles.

He founded the Intelligent Transportation Systems (ITS) lab at Louisiana Transportation Research Center and the LSU driving simulator facility. At UAH, Ishak established a Regional Traffic Management Center for the North Alabama Region in partnership with Alabama Department of Transportation.

"Expanding our research portfolio begins with the faculty," he said. "A more focused, high-impact research strategy, that addresses critical and emerging challenges, while responding to today's societal needs will increase local and national recognition and create more opportunities for growth and expansion."

Ishak chairs the Transportation Research Board Standing Committee on Artificial Intelligence and Advanced Computing Applications (ABJ70), which promotes and advances interdisciplinary research at the intersection of the fields of transportation engineering and computer science and information technology. He is also a member of the five-year National Cooperative Highway Research Program (NCHRP) panel for maintaining and executing a research agenda for the Connected and Automated Vehicles (CAV) roadmap.

"This is an exciting time to be a civil engineer," he said. "As the U.S. and nations around the world continue to seek innovative ways to reinforce and rebuild their aging infrastructure, civil engineers are called upon to be well prepared to tackle existing and new societal and environmental challenges, while striving to create more sustainable communities."

# 13 future women leaders in engineering get a head start

story and video by Keith Pierce

Continental Automotive, Sumitomo, Clark Nexsen, Century Concrete, Huntington Ingalls Industries and NASA are among the real-life experiences thirteen female engineering freshman recently enjoyed as part the Early Engineering Advantage Program (EEAP). From intense instruction, engineering site visits, group projects and presentations, the two-week, residential program is designed to provide incoming female freshman, who are majoring in any engineering discipline, an early advantage before starting fall classes.

"In addition to giving them a head start in a male-dominated major, we want to create a sense of community among this group of young women that will allow them to grow together and become a resource to one another throughout their four years at the college," said Rafael Landaeta, associate dean of the Batten College of Engineering and Technology.



See more in this brief video:

Funded for admitted students by the Virginia Space Grant Consortium, Norfolk Southern, Continental Automotive and other sponsors, EEAP takes place in early August each year.

"What I loved most was being able to understand all the other disciplines and how they connect in ways you wouldn't imagine," said Zhenja Lourenco, a mechanical engineering freshman from Virginia Beach, Va.

## AWARDS SPOTLIGHT:



**KHAN IFTEKHARUDDIN**

Congratulations to **Dr. Khan Iftekharuddin**, professor and associate dean for research and graduate programs, as well as director of the ODU Vision Lab, for being awarded a *Certificate of Merit* by the IEEE Signal Processing Society for "outstanding editorial board service for the IEEE Transaction on Image Processing."



**MARY ADDISON**

Congratulations to our own, **Mary Addison**, recognized as ODU's Hourly and Classified Employees Association (HACE) *Staff Member of the Year* for 2018!

photos by Keith Pierce

[www.ODU.edu/eng](http://www.ODU.edu/eng)

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