

MoMEntum

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Richard Onyancha boosts engineering education in sub-Saharan Africa

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Associate Professor Richard Onyancha completed a year-long sabbatical in sub-Saharan Africa, where he worked to enhance engineering education in the region.

As one of 1,100 U.S. Fulbright Scholars studying around the world, Onyancha worked with faculty and students at The Copperbelt University in Zambia, which established a School of Engineering just five years ago. He worked on a wide variety of fronts to enhance engineering education at the university including conducting workshops on grant proposal writing and the use of MATLAB and Simulink.

"I had a very strong sense of wanting to go back to Africa to see if I could in some way give back," says Onyancha, a native of Kenya.

During the sabbatical, he initiated a formal understanding between a large mining company and the university to establish a meaningful partnership to benefit engineering students. Onyancha also authored a proposal that will provide important engineering software for the university through Siemens PLM Software.

He also took part in a study to determine why Zambia has failed to increase access to electricity in its rural areas despite that being a long-time goal of the country's government. The study, which compared efforts in Zambia with more successful efforts in Kenya and Nepal, identified gaps in existing policy as at least part of the reason for the failure.

Onyancha also presented research on the current state and future of engineering education in Zambia and he urged that steps designed to increase female participation in engineering education be undertaken.

Despite the newness of the engineering program at Copperbelt University, Onyancha believes it has significant potential to reduce sub-Saharan Africa's chronic lack of engineering resources. The Copperbelt University School of Engineering "has a lot of promise," Onyancha says. "The students are extremely determined and resourceful."

The sabbatical also included cultural educational experiences for Onyancha, who attended local events, spent Christmas at Victoria Falls, and who gave the U.S.-embassy sponsored presentation for Martin Luther King, Jr. Day in January.



Richard Onyancha conducted curriculum development workshops with the engineering faculty at Copperbelt University in Zambia. He would like Rose-Hulman to continue to help the university address sub-Saharan Africa's shortage of engineering resources.

For the most part, the faculty in the School of Engineering are quite young, Onyancha notes. He believes Rose-Hulman can play a role in helping the program reach its potential.

"I would really like to see the Institute think about how to provide that leadership to new and upcoming engineering education programs around the world," he says.

Student's Summer Composites Research to Drive HPV Improvements

When Rose-Hulman's Human Powered Vehicle team hits the pavement this season, they'll be trying out a new and improved carbon fiber body, thanks to the summer research project of the group's president, Andrew Miner. The junior mechanical engineering major from New Jersey worked with faculty mentor. Assistant Professor of Mechanical Engineering Simon Jones.

Miner was one of 11 students participating in this summer's Interdisciplinary Research Collaborative (IRC) and Rose Summer Undergraduate Research Program (RSURP). The programs are designed to provide opportunities for undergraduate students to engage in a full-time mentored summer research experience.



Andrew Miner researched standard industry specifications to create test samples for his summer research project in carbon fiber and polymer composite materials. (In other words, he researched to prepare for his research project.)

Projects this year spanned disciplines ranging from biomedical and mechanical engineering to mathematics, computer science and software engineering, biochemistry, and chemistry. Students submit a proposal, accompanied by a letter of support from a faculty mentor, in order to be considered for a summer research slot.

For Miner, the program provided an opportunity to learn more about composites while helping to improve his team's performance in the American Society of Mechanical Engineers' (ASME) Human Powered Vehicle Challenge. The teams are judged on design as well as performance in the competitions.

"One of the problems we face with HPV is we overbuild because we don't know how good our [carbon fiber reinforced polymer] lay-ups are," Miner explains. Because of this, the vehicle ends up heavier, which slows it down and adversely affects team members' endurance. Overbuilding also costs the team design points.

Through his summer research experience, Miner was able to test the strength of the composite materials that the team uses to determine the optimal thickness that would meet safety standards while contributing the least amount of weight to the vehicle.

Professor of Chemistry Mark Brandt (IRC) and Professor of Mathematics Allen Broughton (RSURP) served as directors for this year's jointly run programs. Brandt says the programs help give students a taste of what they can expect in graduate school or research in industry, and helps them apply their classroom lessons to real-life projects.

"Classwork is different. Everybody knows that there's an answer. And research—maybe there is, maybe there isn't," Brandt says. "Having that kind of experience with an open-ended type of project becomes extremely important."

Get to Know Distinguished Teaching Fellow Anjan Ray

This fall, the department welcomed Dr. Anjan Ray as its first Distinguished Teaching Fellow. Dr. Ray comes from IIT Delhi where he had connected first with Dr. Jim Mayhew prior to his sabbatical in India last year. Dr. Ray attended Michigan State University at East Lansing for his graduate studies, where he lived for a little less than six years. And although that experience gave him a level of familiarity with teaching methods in the U.S., he says that he hopes to learn still more during his time here.

"I am of course in a teacher's role and I want to explore how things are done differently in a U.S. institution, and specifically at Rose-Hulman, which has a strong commitment to undergraduate education. At an individual level, I want to also find out whether I can be effective in a different setting, with a different student body," he adds.



Anjan Ray

Dr. Ray taught Conservation & Accounting Principles during the fall quarter, and will be teaching that course as well as Special Topics in Mechanical Engineering during the winter quarter.

"I also hope that since I come from a different background, students can learn something from me. I don't have a clear idea as to what that something is, but I think differences in background can be beneficial, if there is a positive intent to

contribute," he says.

Phil Cornwell Returns to Teaching

After nearly four years as the institute's vice president for academic affairs, Dr. Phil Cornwell has returned to his first love: teaching.

While he enjoyed serving as an ambassador for Rose-Hulman, working to advance its mission, and helping hire new faculty members who are passionate about undergraduate education, Dr. Cornwell says he missed the interaction with students.

"Last year at graduation, I knew hardly any students, and to be honest, it was a bit depressing," he recalls. "I remember a previous graduation where a female graduate told me, 'I couldn't have made it without your help, Dr. Cornwell.' I had her for Con Apps--she had failed it twice before-- and it was wonderful to see her grasp the material, and it was wonderful to see her graduate."

Dr. Cornwell returned to the classroom fall quarter, to teach two sections of Vibrations and one section of Graphical Communications. He couldn't be happier to be back.

"At the end of each day there is a feeling of accomplishment and satisfaction. I love interacting with students in class, in lab, and in my office. I love working with colleagues and discussing with them how to improve the educational experience we provide our students."



Phil Cornwell

Controls Lab Update

Thanks to the generosity of the Geraldine C. and Emory M. Ford Foundation, student experience in the dynamics and controls lab has been improved. Hundreds of students use the lab each year to learn to integrate controls into mechanical systems.

Rapidly changing technology had outpaced the upgrades in the lab. The project was initiated by then-student Chris Olinger (ME, 2015) whose family's foundation provided funding for new USB data acquisition units and software. Olinger felt that the need was a good fit for the foundation's mission and resources, so he reached out to Associate Professor of Mechanical Engineering Brad Burchett.

The equipment was upgraded over the summer. And although Olinger graduated in May, he's made a lasting mark—the upgrade will provide every ME student with an opportunity that is uncommon at the undergraduate level.



The recent controls lab upgrade lets students gain experience integrating controls into mechanical systems.

Aqua(ponics)man: MBA Sabbatical Yields Sustainable New Business Venture

What do aquaponically grown salad, senior design, and crustaceans have in common? It turns out that all three of those topics are tied to one professor's sabbatical.

Dr. Zac Chambers recently returned to full-time teaching from a full-time student gig, pursuing his Master of Business Administration at Indiana State University. Having the time to focus on his studies allowed him to complete all but one course of the program in a year.

"I've had an interest in business for a while. I chose Indiana State University for my MBA—it was an outstanding value for the education I got," Chambers says.



Who's Yer Crawdaddy? Professor Zac Chambers shows off one of the crustaceous creatures that are a part of the small-scale aquaponics trial set-up in the Branam Innovation Center

Now he's taking the lessons he learned both to a new business and back to the classroom.

"My integrated project was doing a marketing analysis and preparing a business plan for an aquaponics operation in Terre Haute." In the process he met Matt Pollom, who was pursuing the same type of enterprise. Pollom had previously helped establish an aquaponics greenhouse at Ivy Tech in Terre Haute. The two decided to join forces to make the aquaponics venture a reality.

While still on sabbatical, Chambers tapped Rose-Hulman's student resources through a capstone design group that created a small scale aquaponics set-up. In it, crayfish provide nutrients for leafy green plants suspended above their tank.

The trial currently resides in the Branam Innovation Center, but the full-scale operation will be built in a building Chambers owns in Brazil, Indiana. That's where the second student group comes in. With Pollom as its client, the second capstone group is designing the layout in the building to "optimize the grow space and maximize the harvesting ability." The plan is to start with leafy greens, then gradually add more vegetables, while raising tilapia, perch, and prawns.

But he didn't only gain business knowledge through the experience.

"I got to go back to school and be reminded of what it's like to be a student. Also, I was able to bring a lot of this back to the classroom," he adds. He is looking forward to delivering his new Business Statistics course this winter quarter and is a member of the steering committee which is coordinating a Start-Up Weekend for local entrepreneurs.

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