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360° VIEW

News from Rice 360°: Institute for Global Health Technologies

memos **from** malawi

Emily Johnson '17 and young friends show their Rice spirit in Blantyre, Malawi. *Read the story on page 4.*

FIRST DEGREE

Welcome to 360° View, our redesigned newsletter to give you a complete view of what is happening at Rice 360°: Institute for Global Health Technologies and Beyond Traditional Borders. We hope you will enjoy the new format — please send us a note to let us know what you think!

We are settling back into school after a busy and exciting summer — detailed in these pages. On campus, students in the Beyond Traditional Borders program have received their new global health design challenges and will begin designing their innovative solutions in the Oshman Engineering Design Kitchen.

Hope to see many of you on campus soon!

Warm Regards,
Rebecca Richards-Kortum, Ph.D.
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Special thanks to volunteers Piper Madland, Sabina Madland and Sunny McKinnon who donated their time and talents to the creation of this newsletter.

Circling back: andy miller

In May 2009, Andy Miller graduated from Rice University with a degree in bioengineering and a minor in Global Health Technologies. For his senior project with Beyond Traditional Borders (BTB), he designed a low-cost, lunchbox-sized microscope that can detect tuberculosis. The microscope runs on batteries, weighs less than three pounds and can be produced for just over $200. With results pitted against conventional laboratory microscopes, Andy's microscope had the same results in 98.4 percent of the tests, offering medical professionals a viable option for diagnosing tuberculosis in the field.

Andy, who grew up in The Woodlands, is now product design engineer at 3D Systems in San Francisco and credits BTB with giving him the ability to realize his ambition and help change the world through meaningful design.

"Through my experiences with BTB, I left Rice addicted to an idea: I can change the world through engineering and design. This enthusiasm and optimism has carried into my professional career as an entrepreneur and medical device engineer. I will never forget the central mission of BTB: to create a new generation of globally minded leaders in the field of health technology."

Since graduation, Andy has successfully used crowdfunding to further global health technology interventions, started a small business that brings tele-medicine to remote locations and pioneered 3D printed, patent-specific medical devices.

BTB graduates are changing the world. Congratulations, Andy, on your success.

Have a BTB success story you'd like to share? Contact Liz McGuffee at lizmcguffee@rice.edu or (713) 348-4491.

Full circle: grants and awards

$1.9M

HHMI STEM-retention grant

- Rice 360° received a three-year grant from Howard Hughes Medical Institute (HHMI) to alter several of its introductory science courses to include the hands-on teaching strategies that have proven successful for increasing retention of STEM (science, technology, engineering, mathematics) majors in the hands-on BTB program. HHMI is a science philanthropy whose mission is to advance biomedical research and science education for the benefit of humanity.
- Pictured above are 2014 Global Health Technologies minor graduates with Maria Oden and Rebecca Richards-Kortum.

$250,000

Saving Lives at Birth: A Grand Challenge for Development

- Rice 360° received seed money from Savings Lives at Birth (SLAB) to continue development of BreathAlert (see page 6) and finance clinical trials in the field.
- SLAB is a partnership of five international organizations which aims to find solutions to help mothers and newborns survive birth.

BTB interns and colleagues enjoy a moment at Lake Malawi.

13.9500° S/33.7000° E: memos from malawi

Since 2007, Malawi has been the center of attention for Rice 360˚ and Beyond Traditional Borders (BTB) initiatives. The work runs the gamut, from creating technological innovations that save lives, to sending interns with prototypes for feedback and problem solving, to, most recently, participating in the groundbreaking for a new neonatal wing at Queen Elizabeth Central Hospital, Malawi's largest teaching hospital, located in Blantyre.

Pang'ono pang'ono

According to the World Health Organization (WHO), the donation of equipment to hospitals in resource-poor countries can significantly benefit healthcare services. The problem with the donations, says WHO, is multi-factorial, including the lack of single-use consumables, spare parts, technical expertise and more.

Rice BTB students in Malawi are helping to alleviate some of the challenges by offering troubleshooting classes at Malawi Polytechnic (Poly), a college of the University of Malawi. The classes are offered in cooperation with the Physical Assets Management (PAM) department at the Queen Elizabeth Central Hospital (QECH).

This summer, the students split time between Poly and QECH. At Poly, they worked with electrical engineering students and faculty members. At QECH, they worked with technicians in charge of equipment repair as well as nurses and health-care practitioners to familiarize them with the equipment and technology.

Writing in the Reports from Malawi student blog, Jacinta Leyden, '14, explains that even though technicians and engineers are well trained and technically competent, the frustrations are many. Equipment is unused because of lack of spare parts or service manuals. Even simple issues

Jacinta Leyden '14 with PAM technicians.

such as the absence of voltage converters to make 110V equipment usable in the 220V world of Malawi prevents much-needed equipment from functioning. Likewise, healthcare professionals, although they are eager to put the new technologies to work, are unable to utilize the equipment because of lack of training or replacement parts.

Ms. Leyden and her fellow interns added to the troubleshooting tool chest for technicians and provided training for professionals in the hospitals.

With a note of optimism, she reports seeing more mention of the problem in the Malawi press, noticing training programs and classes popping up in Blantyre and hearing more professional discussions about the problem. On that note, she is hopeful that progress is being made. *Pang'ono pang'ono*, she writes – little by little.

Nursery of the Future

As a complement to the work of BTB students and the Rice 360˚ initiative, Rebecca Richards-Kortum, director of Rice 360˚: Institute for Global Health Technologies, and Maria Oden, director of Oshman Design Engineering Kitchen, have raised $375,000 in donations via the Day One Project and donations from individuals to build a neonatal ward at Queen Elizabeth Central Hospital (QECH) in Blantyre, Malawi.

The money is being used to build a modern, cost-effective neonatal clinic at QECH. The clinic will serve as a pilot to create the Nursery of the Future, a collection of low-cost, neonatal technologies that a district hospital serving 250,000 people can implement for about $5,000.

The neonatal nursery is closer to becoming a reality with a groundbreaking at QECH in July 2014 and construction well underway this fall. The hospital serves as a vital partner in Rice's goal to deliver low-cost, student-designed healthcare technologies.

The summer of 2014

Eleven Rice students interned this summer in Africa, living the BTB dream of becoming a globally minded leader in health technology. Eight students were in Malawi, with three in Namitete and five in the capitol Blantyre.

The eight students who were in Malawi include: Joao Ascensao '16; Emily Johnson '17; Jacinta Leyden '14; Carissa Livingston '15; Caleb Owsley '15; Truce Pham '17; Aakash Shah '17; and Jesal Shah '15.

Truce Pham '17 and Jesal Shah '15 with new friends in Namitete.

Two students participated in internship programs in the United States including Bailey Flynn '15 with 3rd Stone Design in California and Kamal Shah '15 with PATH in Washington. Additionally, Samatha Olvera '15 (pictured below, right) interned with the World Health Organization in Geneva, Switzerland.

BTB students in 2014 and past years are supported in their internships through the donations of individuals, companies and the Howard Hughes Medical Institute.

For a first-hand description of the interns' experiences in Malawi, visit www.malawi.blogs.rice.edu/. To learn more about sponsoring a BTB student, contact Liz McGuffee at lizmcguffee@rice.edu or (713) 348-4491.

Other angles: more news

Andrea Ulrich '12, left, a member of the Rice BTB team that designed BreathAlert, and OEDK Director Maria Oden at the SLAB conference where Rice received funding (see page 3).

We're reminding babies to breathe

PROBLEM: A premature infant often exhibits apnea of prematurity, which causes him or her to stop breathing during sleep and can result in brain damage or death. In resource-poor nations, the existing technology to monitor for apnea is too expensive to purchase and requires constant electrical power. Also, caregivers are commonly overworked, having numerous infants under their care.

SOLUTION: Rice 360˚ teams have developed BreathAlert, an apnea monitor that detects cessation of breathing and stimulates the infant to resume breathing. If no breathing occurs within five seconds of the stimulation, an alarm notifies caregivers that the infant requires immediate attention. Long term the target cost is less than $35 per unit and the device runs on batteries.

STATUS: Proof-of-concept testing on infants is underway.

We're taking temps

PROBLEM: Temperature variation in a neonate can be a signal of underlying problems. How can a parent or caregiver determine if a baby has a fever when digital and mercury thermometers are too expensive for a family?

SOLUTION: Beyond Traditional Borders (BTB) students Joao Ascensao '16 (pictured below, left); Carlos Carames '15; Marriam Hussain '16; and Truce Pham '17 (below, right) designed a neonatal liquid crystal thermometer (LCT) that is low-cost and easy to read. A simple change of color indicates a fever, alerting a parent or caregiver that medical attention is needed.

STATUS: This summer, the interns in Blantyre and Namitete, Malawi, demonstrated the device to clinicians and received valuable feedback about its usability.

The Rice 360° CPAP project is expanding to three African countries this fall — watch for an update in our next issue!

Degree of interest: join the circle

Moni! My name is Liz McGuffee and I am new on the Rice 360˚ team, focusing on communications and development for Rice 360˚: Institute for Global Health Technologies. I'm your contact for anything and everything about Rice 360˚, Beyond Traditional Borders (BTB) and all the related programs — if what you need to know is not in my purview, I will connect you to the right people.

I have watched the BTB program since its inception and I am delighted to be working closely with Maria Oden and Rebecca Richards-Kortum to further the goal of Rice 360˚: to create future leaders who understand global health and develop effective solutions for world health challenges. In my first few months here, I have discovered an exceptional collection of students and faculty members who are globally engaged, creatively inclined, talented and dedicated to making a difference.

My goal is two-fold: to get you involved and to raise funds to move ideas to reality. To that aim, below is a list of ways you can join the circle at Rice 360˚.

Please call or email me with the ways you want to get involved. I want you to join us in the amazing circle that is Rice 360˚.

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Sponsor an intern

Beyond Traditional Borders (BTB) is the undergraduate component of Rice 360˚, designed to engage students in finding solutions to global health problems. Along with traditional studies, BTB offers students internship programs in the U.S and abroad, particularly in resource-poor nations. Individuals and companies are needed as sponsors. A full sponsorship is $10,000.

Spread the word

Let's talk! Get your friends and fellow alums talking. Host a dinner party in your home. Gather friends over lunch. Meet our students and staff, and check out the technologies in development. We can come to you or meet here at Rice. I guarantee you that you will be amazed, intrigued and inspired. Support our efforts by spreading the word and supporting the work.

Step up to our table

Critical to the BTB undergraduate program are the design courses, where students develop low-cost, appropriate technologies in the Oshman Engineering Design Kitchen (OEDK). In particular, students are challenged to address real-world healthcare problems that exist in low-resource settings. Team sponsorships are $5,000 and $7,500 and donors have the opportunity to interact with their team during the year.

L to R: Intern Carissa Livingston '15 takes parts and supplies to the Polytechnic in Malawi. The Austin doctors group who joined forces to sponsor a BTB intern check out design projects at the OEDK. Caleb Owsley '15 and Jacinta Leyden '14 at work at the OEDK design table.

Rice 360°: upcoming events

The Rice University Homecoming and Reunion is Friday, November 7 through Sunday, November 9. During the weekend, Rice 360˚ is pleased to host:

Classroom Connect

Friday, November 7 at 1 p.m.
Oshman Engineering Design Kitchen (OEDK)

- Rice 360˚ Director Rebecca Richards-Kortum will present *Global Health at Rice: How Designing Low Cost Technologies Teaches Courage and Creativity*. Dr. Richards-Kortum will offer insight into the Rice 360˚ and Beyond Traditional Borders programs, outlining technology success and highlighting the work throughout the world.

- An **Open House** reception and tour of the facility will be held after the presentation from 2 to 3 p.m. Attendance at Classroom Connect is not required for the Open House. *OEDK is #59 on your campus map, available at http://www.rice.edu/maps/maps.html.*

Calling all former BTB students

Maria Oden and Rebecca Richards-Kortum want to connect with former Rice 360° and BTB students to catch up on where their careers are leading, meet one another and find ways they are changing the world through global innovation.

Groups of BTB alums in San Francisco, DC and Seattle have all come together – Boston and NYC are next! Let us know where you are so we can let you know when they are coming to your city.

Alums who are unable to meet in person are invited to connect via social media. Join on Facebook at www.facebook.com/BTB.Rice360. Get in the conversation on twitter @Rice360atRiceU.

Washington, DC-area BTB alums with Dr. Richards-Kortum and Dr. Oden.

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