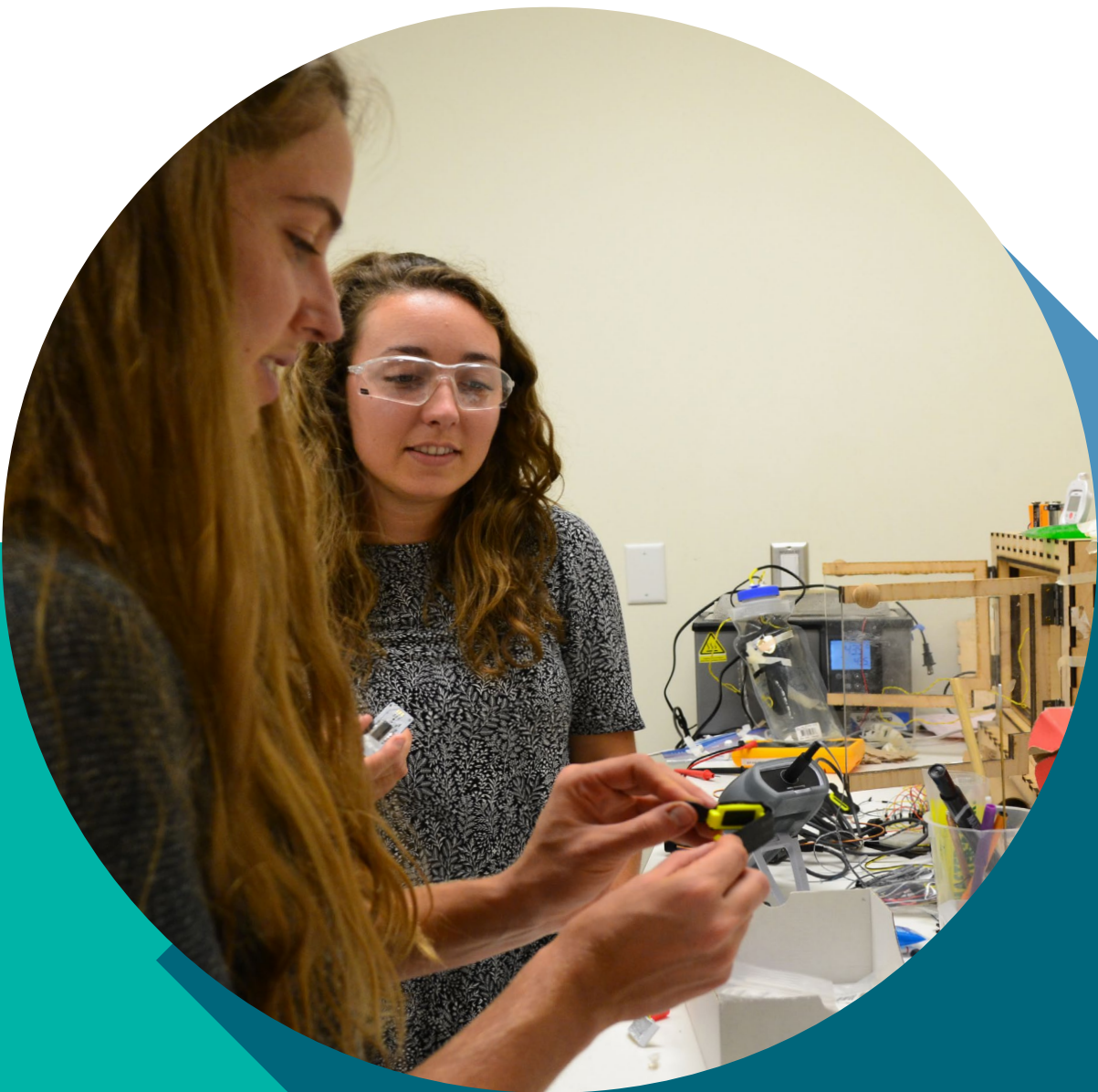


360° VIEW

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News from Rice 360° Institute for Global Health



from **concept** to **reality**

Rice 360° Global Health Fellows bridge the gap, advancing innovative ideas to clinical application



SUMMER = TRAVEL

Summer is wonderful at Rice 360° because it's the time of year when we are on the road. We visit our interns in Malawi, Brazil and at the Texas border. We welcome Malawian interns to the OEDK. Cross-cultural innovative exchange occurs.

In June, I visited our partners in the Rio Grande Valley, where we are addressing patient education for diabetic wounds. Our partners are excited about this Rice 360° solution! Malaz Mohamad, who is a Rice 360° intern in Brownsville, is introducing a 3-D printed foot model that she and her teammates created for their capstone design project. Read more about the project on page 3.

All our interns are working hard on presenting, scoping and designing global health solutions in the field. They are learning critical skills such as leadership, empathy, observation and implementation. But, most of all, they are realizing that each of us can make an impact, and that the need for health equity—locally and globally—is great.

Thank you for your continued support,
Maria

Maria Oden, Ph.D.
Co-Director, Rice 360° Institute
for Global Health
Director, Oshman Engineering
Design Kitchen
Professor in the Practice,
Bioengineering

new perspective: global is local

Global. That's the world today. Within seconds, we can reach across oceans and mountains and connect to most anyone, anywhere. Global is the buzzword. Global markets. Global industry. Global solutions. Global reporting. Global leaders. The list goes on and on.

When we read the word global, more often than not, we conjure up places outside the United States. We think of lands and peoples and cultures in far-away settings. Often we envision settings where poverty is high and resources are low.

Rethinking global as local

It's time to redefine global, especially when referencing healthcare. Global healthcare solutions are for all, and while our emphasis might be on areas where need is the greatest, Rice 360° is leveraging its resources and technologies to create better healthcare opportunities and eliminate health inequalities for the most vulnerable people – whether the people live in Malawi or Brazil or right here in Houston.

Global health is local health. The technologies of Rice 360° are improving the lives of people who are as far away as Africa and as close as a rural area near the Texas-Mexico border or one day, in an EMT vehicle racing to the Texas Medical Center.

Fighting cervical cancer on the border

Cervical cancer is a leading cause of women's cancer deaths in low- and middle-income countries where women have limited access to healthcare. Because cervical cancer screening and diagnostic tools are often not available in low-resource settings, Rice 360° has refined the use of a high-resolution microendoscope (HRME), a point-of-care diagnostic tool that offers real-time diagnoses where there is a lack of traditional technology.

As well as being used for real-time diagnoses of cervical cancer in urban and rural settings in Brazil, China, Costa Rica and El Salvador, the HRME is being field-tested at the University of Texas Rio Grande Valley Smart Hospital in Brownsville, along the Mexican border.

Diagnostic tool for diabetic foot

Individuals with diabetes are at significant risk of having peripheral neuropathy, or lack of sensation in their feet. As a consequence, small cuts on the feet can go unnoticed

and untreated, potentially leading to infection, diabetic foot ulcers and often amputation. Although diabetic patients received adequate hospital care, many cannot afford regular clinical visits. In November 2015, a team of Rice students took up the challenge and designed a dynamic simulation system to educate patients about diabetic wound care.

While the need for education exists globally, the need for treatment is especially great in the Rio Grande Valley, where there is a large Hispanic population with limited access to healthcare and high susceptibility to con-

University wanting to design change. Now, I am a part of the change," says Malaz. "A diabetic foot ulcer followed by amputation increases an individual's mortality risk more than a diagnosis of breast or prostate cancer. Here in Texas, just a few hundred miles south of Houston, I am teaching individuals to recognize the signs and care for these wounds at home, preventing deterioration and amputation."

A possibility: CPAP in emergency vehicles

Respiratory illness is one of the leading cases of neonatal death worldwide. In modern hospitals, health-

Baylor College of Medicine, Texas Children's Hospital and Queen Elizabeth Central Hospital in Blantyre, Malawi.

In addition to wide-spread use in international, low-resource settings, technologies designed to be rugged, portable and have limited electrical draw could have domestic applications as well. For example, with the appropriate approvals, the Rice-designed Pumani CPAP, now produced and distributed by Hadleigh Health Technologies, could potentially serve in US emergency shelter situations or when transferring babies in respiratory distress in ambulances.



Team Wounder Women: Emily Huang, Kelly MacKenzie, Hanna Anderson, Malaz Mohamad and Mariam Hussain.

ditions such as diabetes. Designed by the Wounder Women team, the simulation system is now being field tested at the SMART Hospital and South Texas Simulation Network at University of Texas Rio Grande Valley.

Malaz Mohamad, a Rice 360° intern and member of the original design team, is part of the team testing the device. "I came to Rice

care professionals can use bubble Continuous Positive Airway Pressure (bCPAP). However, CPAP machines are expensive and complex for low-resource situations.

To provide a low-cost solution, a team of Rice University students developed a device now called the Pumani CPAP, which has been refined in collaboration with clinical partners at

Global is community

"At Rice, we often find our inspiration in situations and settings where the prospect of healthcare is dire," says Rebecca Richards-Kortum, Director, Rice 360° Institute of Global Health. "Yet, the closer we look and the more we find challenges, we realize that technology is a global force – one that can have an impact across the world as well as around the corner."

Completing the circle: rice fellowships transform technology innovations into clinical reality

Each semester, under the umbrella of the Rice 360° Institute for Global Health, students address the challenges faced by healthcare professionals throughout the world. Challenges include babies in acute respiratory distress or with neonatal jaundice, premature infants with apnea, pregnant women with hypertension and more.

Student teams working in senior capstone classes are challenged to design low-cost, innovative devices to tackle problems of global healthcare and health inequities. Ideas are transformed into prototypes with the potential to become sustainable solutions.

Although the seniors graduate, their prototypes need refinement, testing and commercialization.

Making the connection

To meet this need, Rice 360° launched Global Health Fellows, an innovative post-baccalaureate fellowship designed for engineering graduates with a strong interest in global health technologies. Chosen after a rigorous inter-

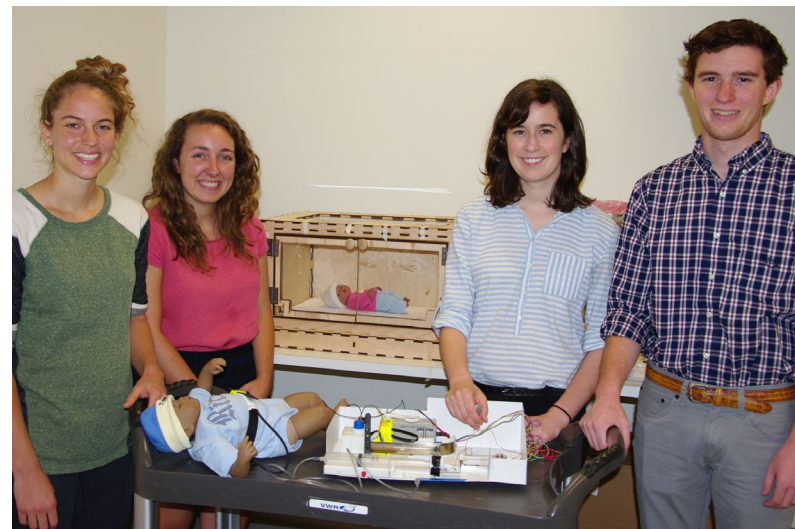
view process, eight individuals have been admitted into the program since its inception in 2010.

Meet the Fellows

Fellows split their time working on campus and with international clinical partners. Each Fellow is dedicated to a single technology for evaluation, clinical trials and, eventu-

low-resource settings," says Erica Skerrett '15. "Throughout this past year, I have improved my design, circuitry and programming skills, and I have also had the unique opportunity of running a three-month clinical trial in a government hospital in Blantyre, Malawi."

Currently, four individuals are participating as Rice



Fellows Becky Selle, Mary Kate Hardy, Erica Skerrett and Matthew Pesce.

ally, guiding it through to implementation and commercialization.

"As a Global Health Fellow and project leader with Rice 360°, I am currently working full-time on the development of AutoSyp, a low-powered syringe pump for use in

360° Fellows including Erica; Mary Kate Hardy from Vanderbilt University; Matthew Pesce from the University of Pittsburgh and Becky Selle from the University of Maryland-College Park.

Important technologies

A variety of appropriately

Fellows in the community

In April 2016, John Collier, executive director of Caring Friends Inc. and member of Rotary Club of West U, invited Global Health Fellows Mary Kate Hardy, Becky Selle and Erica Skerrett to introduce Rotary members to Rice 360° and its work around the globe.

It was a natural fit says Mr. Collier, who knew of Rice

360° through his nonprofit's work in Haiti. "Rotary is a service organization and when we see gifted young adults working to create low-cost, high-tech solutions that address the needs of the sick and suffering in the world, it is very encouraging and inspiring. The presentation really spoke to the heart of what Rotary is all about."

Mr. Collier, who describes himself as a community cheerleader for Rice 360°,

encourages other groups to learn more about the program. "Rice 360° is an uncommon intellectual gift, allowing students to take on health-care challenges and change the world. Get in touch. It's a remarkable experience."

To have a Fellow speak to your group, please contact Liz McGuffee at lizmcguffee@rice.edu or (713) 348-4491. To support a fellow, call Liz or visit www.rice360.edu/donationform.

designed medical technologies for newborn care are desperately needed in resource-limited countries. According to a study by Rice 360°, just 17 technologies are needed to address 82 percent of preventable neonatal deaths in low-resource hospitals.

Nine of these 17 devices are in the development pipeline at Rice 360°, including:

- **Pumani CPAP device** developed by Jocelyn Brown '10, an original Rice Fellow. Today, the respiratory device for newborns and children has received regulatory approval in Europe,

Asia and Africa and is on the approved-device list for Doctors Without Borders.

- **AutoSyp** was supported by Alexa Juarez '14 before Erica, and is being refined to reduce its electrical draw and size based on clinical feedback from physicians at Queen Elizabeth Central Hospital in Blantyre, Malawi.

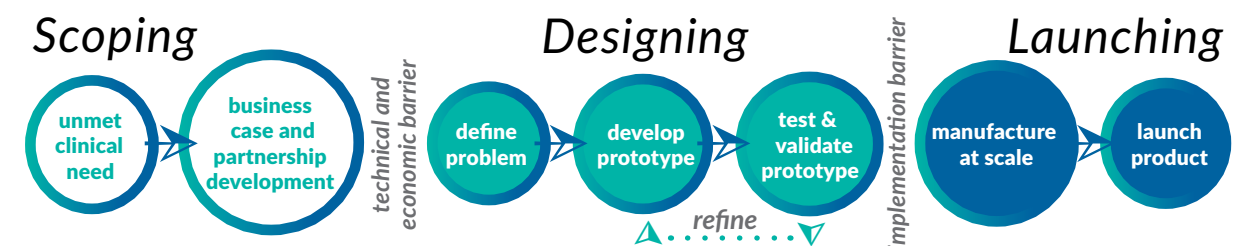
- **BreathAlert**, which helps premature infants at risk from apnea, was developed by a 2012 Rice 360° team and its development is currently being advanced by Becky and Matt, who are the third and fourth Fellows to work on this project. Breath-

Alert is in testing at Texas Children's Hospital in Houston, Texas and at Queen Elizabeth Central Hospital in Blantyre, Malawi.

- **Incubaby**, a low-cost neonatal incubator for infants in the developing world, was developed by a capstone team, and Fellow Mary Kate is working to improve the temperature sensor and ventilation.

Global Health Fellows are the connection between concept and clinical reality. The program transforms young engineers into real-world architects for change in the global-health arena.

From concept to reality: the process



Extending the circle: owls beyond borders

For the ninth summer, Rice students are on the move, traveling to healthcare destinations around the globe. The students spend their summers teaching, training, being trained, troubleshooting, researching and refining prototypes and more. Each of the summer interns will be reporting online at <http://www.rice360.rice.edu/#!intern-blogs/zkblw>.

You can be a summer intern supporter. Contact Liz McGuffee at lizmcguffee@rice.edu or (713) 348-4491.

HOUSTON, TEXAS

At the Oshman Engineering Design Kitchen at Rice University, Rice bioengineering major Sonali Mahendran '18 is joined by Malawian interns including Chimwemwe Kunje, Hillary Lodzanyama, Waheed Elick Mia, Mary Mnawa and Borgenstein Zibophe. Projects include tools for safe surgery, a pneumatic compression device and clean water projects.

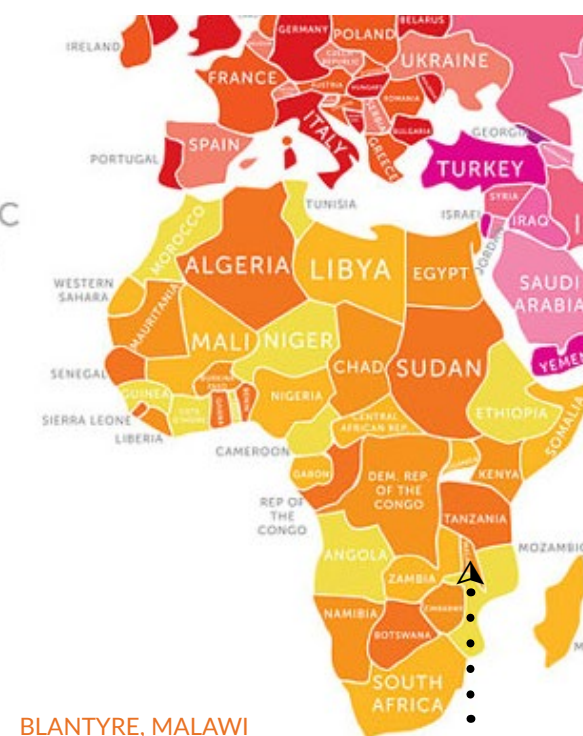


BROWNSVILLE, TEXAS

Malaz Mohamad '16, Rice psychology major and global health technologies minor, is working at Smart Hospital and South Texas Simulation Network at University of Texas Rio Grande Valley to refine a dynamic simulation system for use in hospitals for diabetic wound-care education.

BARRETOS, BRAZIL

Rice undergraduates Patricia DaSilva '18 and Nikhil Shamapant '17 are furthering development of a wound-care educational device, translating a manual into Portuguese and developing cancer-prevention materials at *Hospital de Cancer de Barretos*.



BLANTYRE, MALAWI

Rice students Christine Diaz '17, Tahir Malik '17, Leah Sherman '18 and Theresa Sonka '18 are at The Polytechnic at the University of Malawi continuing development of a mechanical breast pump and identifying local materials to build and repair oxygen concentrators.

BLANTYRE, MALAWI

At Queen Elizabeth Central Hospital (QECH), Rice students Caroline Brigham '17, Kinsey Dittmar '16 and Elizabeth Stone '18 are testing and creating a CPAP heating sleeve and a neonates thermoregulation system. Additionally, they are decommissioning and disposing of old CPAP devices and salvaging any reusable parts.



Exchanging degrees

In a reciprocal exchange, students from the University of Malawi are invited to travel to Houston and the Oshman Engineering Design Kitchen (OEDK). The program, nicknamed SEED for Summer Experience in Engineering Design, is designed to promote shared innovation and problem solving between students at both universities.

Shown above with some of their Rice 360° counterparts are this year's student interns, including Chimwemwe Kunje, Hillary Lodzanyama, Waheed Elick Mia, Mary Mnawa and Borgenstein Zibophe.

SEED is made possible with support from the Lemelson Foundation and Rice 360° Institute for Global Health.

To learn how you can support the Rice 360° summer intern program and SEED, contact Liz McGuffee at lizmcguffee@rice.edu or (713) 348-4491.

Outside the circle: news of 2016 owls

Our parliament of owls

As we reluctantly say goodbye to our 2016 Global Health Technologies graduates, we salute them as they travel to new adventures, furthering the mission of global health.

Hanna Anderson is headed to the Blue Ridge Mountains of Virginia to be an associate at Blue Mountain Organics, an organic foods producing company. She intends to pursue a master's in public health in a few years.

Joao Ascensao will spend the year in Barcelona, Spain, in the lab of Dr. Jordi Garcia-Ojalvo at *Universitat Pompeu Fabra*. His research area will be the dynamics of gene regulatory networks. In the fall of 2017, he will join the bioengineering PhD program at UC Berkeley/UCSF to focus on systems biology.

Kinsey Dittmar is a Rice 360° intern this summer. She will finish 2016 conducting a community-needs assessment, examining maternal and infant health at Project Mercy in Yatebon, Ethiopia, as part of the Wagoner Fellowship. She begins medical school at the University of Texas Health Science Center San Antonio in 2017.

Anjali Kumar will start at Baylor College of Medicine.

Kelly MacKenzie is in Chicago, Illinois and will embark on a graduate program in public health at Loyola University Chicago. Kelly is applying to medical school with a plan to start in 2017.

Malaz Mohamad is in Brownsville, Texas (see story page 2) implementing her team's senior design project. Malaz plans to pursue a psychology degree in clinical psychology after working in the industry for a few years.

Nkechi Nwabueze is headed to medical school at Vanderbilt University.

Whitney Orji will begin medical school at the University of Pennsylvania in Philadelphia.

Katie Powers will begin medical school at McGovern Medical School – University of Texas Houston. She hopes to pursue global health in the future.

Tanya Rajan, writing from Dallas, plans to work in global health and development for the next few years and then apply to graduate school for a Ph.D. in economics.

Momona Yamagami is moving to Seattle, Washington to pursue a Ph.D. in electrical engineering, with a focus on medical devices.



RICE 360°

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Other angles: events of interest at rice

FAMILIES WEEKEND **Friday, Saturday and Sunday,** **October 14, 15 and 16**

Rice families can explore the student experience, participate in learning opportunities and cheer the Owls football team. Rice 360° will host an open house at the Oshman Engineering Design Kitchen (OEDK) where visitors can discover technologies created by our students.

RICE HOMECOMING **Friday and Saturday, October 21 and 22**

Everyone's invited for a weekend of reunions, Rice Owls tailgates and more celebratory events, including an open house at the OEDK hosted by Rice 360° Global Health Fellows. For more homecoming

events, visit <http://alumni.rice.edu/homecoming>.

ELEVATOR PITCH COMPETITION **November, date to be announced**

Parents, students and friends are invited to the 8th Annual Elevator Pitch Competition, featuring engineering design project teams as well as independent design project ideas from the engineering school and others across campus. Ninety-second pitches are presented for chances to win cash prizes. More information to come.

For more information, please contact Emily Mooney, emm9@rice.edu or (713) 348-2229.