

# BME

DEPARTMENT OF  
BIOMEDICAL  
ENGINEERING  
AT THE  
UNIVERSITY OF  
ROCHESTER

fall 2017



**HAJIM**  
SCHOOL OF ENGINEERING  
& APPLIED SCIENCES  
UNIVERSITY OF ROCHESTER



SCHOOL OF  
**MEDICINE &  
DENTISTRY**  
UNIVERSITY OF ROCHESTER



## contents

MESSAGE FROM THE CHAIR **4**

FUNDING NEWS **5**

NEW APPOINTMENT **9**

NEW PATENTS **9**

FACULTY HONORS **10**

DEPARTMENT NEWS **12**

STUDENT FELLOWSHIPS  
& SCHOLARSHIPS **14**

DESIGN DAY **18**

ALUMNI UPDATES **20**

CENTERS WITHIN BME **22**

DEGREES AWARDED **23**

## about this publication

*This magazine is an annual publication of the Department of Biomedical Engineering at the University of Rochester. For questions or comments about this issue, or to request a hard copy, please email [dalecki@bme.rochester.edu](mailto:dalecki@bme.rochester.edu).*

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# UR BME mission

*"DISCOVER, CREATE,  
AND EDUCATE TO  
ENGINEER EVER  
BETTER SOLUTIONS  
IN BIOMEDICAL  
RESEARCH AND  
HEALTHCARE"*

## research areas & affiliations

### research areas

Biomechanics  
Biomedical Imaging  
Biomedical Optics  
Biomedical Ultrasound  
Biomedical Nanotechnology  
Neuro & Sensory Systems Engineering  
Regenerative Medicine

### bme-affiliated research centers & institutes

Aab Cardiovascular Research Institute  
Center for Emerging & Innovative Sciences  
Center for Medical Technology and Innovation  
Center for Musculoskeletal Research  
Center for Oral Biology  
Center for Visual Science  
Clinical & Translational Science Institute  
Institute for Neuroscience  
James P. Wilmot Cancer Center  
Rochester Center for Biomedical Ultrasound  
Rochester Center for Brain Imaging

### -ON THE COVER-

Second-year PhD candidate Xuan (Sabrina) Pan is pictured in the lab of Catherine K. Kuo, Associate Professor in the Department of Biomedical Engineering, in Goergen Hall. Her current projects focus on the role of lysyl oxidase in regulating mechanical property elaboration of embryonic tendon during development. "We hope to improve upon tendon healing and engineering by simulating mechanisms of forming normal tendon in embryos," Sabrina says.





## message from the chair

As Chair of the Department of Biomedical Engineering at the University of Rochester, I am eager to share with you our latest advances in research, developments in education, and updates on achievements of our BME students, faculty, and staff.

This year our BME faculty members had outstanding success in securing new funding for their research laboratories. Their successes include new grants, from the NIH, NSF, and other agencies, on BME topics as diverse as nanoporous membranes for hemodialysis, diffuse optical imaging technologies, virtual reality, tendon biomechanics, therapeutic biomaterials, biomedical ultrasound, multisensory processing, second harmonic imaging, and other innovative topics (pages 6-9). Our faculty have also engaged in exciting new industry partnerships, many of which were enabled by the Center for Emerging and Innovative Sciences (page 5).

I'm also delighted to share with you some outstanding honors of our faculty and staff (pages 10-13). Special congratulations are in order for Professor Amy Lerner as she was the recipient of the prestigious Goergen Award for Excellence in Undergraduate Teaching. Professor Kevin Parker was named a Fellow of the National Academy of Inventors for his outstanding inventions in medical imaging and image processing. Professor Danielle Benoit was named Rochester's Young Engineer of the Year. Donna Porcelli, our long-standing BME Graduate Program Administrator, was honored with the Witmer Award for Distinguished Service.

Our talented BME undergraduate and graduate students continue to garner numerous awards and honors (pages 14-17). Our students have been recipients of new fellowships, won design and entrepreneurial competitions, and have been recognized with national and local awards. Be sure to also review some of our BME students' projects that were presented at the Hajim School Design Day (page 18).

These are exciting times for UR BME and I hope you enjoy reading about all of these wonderful updates from Rochester in this issue of the UR BME magazine.

**Diane Dalecki**

*Chair, Department of Biomedical Engineering*

# funding news

For information on how to support the research of our BME faculty, please contact Eric Brandt at [ebrandt@alumni.rochester.edu](mailto:ebrandt@alumni.rochester.edu) or 585.273.5901

## Center for Emerging Sciences (CEIS) Awards

The following awards were made possible through the Center for Emerging and Innovative Sciences (CEIS). The CEIS works with university researchers to facilitate collaboration between university faculty and companies with similar research goals. The CEIS utilizes state funding to support company-sponsored research conducted at Universities including the University of Rochester.



**James McGrath** received funding for the project titled, "Electrical Monitoring of Exosome Capture on Nanomembranes." The project is funded jointly by the CEIS and SiMPore.

## Stephen McAleavey

received funding for the project titled, "Continuation of Towards Automated Clinical Evaluation of Tendon through Shear Wave Elastography." The project is funded jointly by the CEIS and Carestream Health, Inc.



**Diane Dalecki** received funding for the project titled, "High-frequency Quantitative Ultrasound Systems for Tissue Engineering." The project is funded jointly by the CEIS and Imaginant, Inc.

## University Research Awards

Two of our BME faculty members were awarded 2017 University Research Awards to pursue promising projects that have the ability to leverage external funding.



**Scott Seidman** will work with Alice Quillen, professor of physics and optics and Hesam Askari and Jessica Shang, assistant professors of mechanical engineering, on new strategies for developing miniature robotic devices that can explore hard-to-reach places, provide targeted delivery, and do exploratory sensing. The project is titled, "Robotic Physics of Miniature Crawlers, Swimmers and Burrowers."

## Mark Buckley

will evaluate two approaches to minimizing the loss of corneal endothelial cells during cornea transplants. The project is titled, "Protection of Corneal Endothelial Cells from Surgical Trauma."



# funding news cont.



**Ross Maddox receives AR/VR Pilot Funding for collaborative project**  
Professor Ross Maddox (BME and Neuroscience) and collaborators Zhiyao Duan (ECE), Chenliang Xu (CS) have received a pilot grant from the University of Rochester Arts Sciences and Engineering & the Center for Emerging and Innovative Sciences. Their project is titled, "Real-time Synthesis of a Virtual Talking Face from Acoustic Speech."

It's easier to understand someone speaking to you in a noisy room when you can see their face. This is especially true for people who are hard of hearing. The goal of this project is to develop an augmented virtual reality system for generating a realistic speaking face from real-time speech audio by pushing the state of the art in deep neural networks for audio and video processing.



**Ed Lalor awarded AR/VR Pilot Funding**  
Professor Ed Lalor has been awarded AR/VR pilot funding through Arts, Sciences and Engineering and NYS Center for Emerging and Innovative Sciences. His project is titled, "Characterizing the Neurophysiology of Multisensory Integration in Natural and Virtual Reality Environments." The human brain has evolved to seamlessly

integrate information received by multiple senses to markedly improve perception of and behavioral interaction with the world. One of the major challenges facing the field of virtual reality (VR) is how to present information to these multiple senses so that the user's experience is unified and maximally realistic. To do that, it is imperative that we understand how the brain integrates multiple sensory inputs in real-world environments. However, the field of multisensory integration research remains dominated by classic paradigms that are decidedly unrealistic. Recently, the Lalor Lab has developed approaches for analyzing neurophysiological data in the context of more real-world, naturalistic multisensory stimuli. The present project seeks to develop and implement new paradigms for studying multisensory integration during 1) free behavior in a state-of-the-art Mobile Brain-Body Imaging (MOBI) facility at the Rochester Center for Brain Imaging (RCBI), and 2) virtual reality conditions using state-of-the-art VR technology.



**James McGrath receives PumpPrimer II Grant**  
Professor Jim McGrath recently received a Dean's Office PumpPrimer II Grant for his research project titled, "Desalination with Ultrathin Nafion Membranes." The World Economic Forum's Global Risks Report has consistently ranked access to water as one of the most critical issues facing the planet. Arid and drought-stricken regions with ready

access to sea water are investing billions in the production of inefficient reverse osmosis (RO)-based desalination plants to produce drinkable water. Increasingly, technologists are turning to nanotechnology as a means of reducing costs. This project will test a prediction that ultrathin (100 nm thick) Nafion®

membranes have the potential for desalination with orders-of-magnitude greater efficiency than conventional reverse-osmosis (RO). This prediction is based on unexpected findings of a rate of osmotic flux of pure water across ultrathin Nafion® membranes used as electroosmotic pumps.



**Regine Choe receives NIH funding**  
Professor Regine Choe has received an NIH R01 grant for her project, "Longitudinal Monitoring of Bone Fracture Healing Using Diffuse Optical and Correlation Tomography." Vascularization is a key step in bone fracture healing, but is often measured only once or not at all due to technical limitations or cost. Professor Choe proposes to develop and validate optical

instruments for non-invasive, longitudinal monitoring of blood flow, volume and oxygenation in bone fractures and surrounding tissues to predict bone healing. This approach will significantly expedite the development of new bone fracture treatments based on regenerative medicine and the diagnosis of impaired healing. Professor Choe's collaborators include Danielle Benoit (Biomedical Engineering), A. Samuel Flemister (Orthopaedics), John Ketz (Orthopaedics), Wing-Chi Edmund Kwok (Imaging Sciences) and Tong Tong Wu (Biostatistics).



**Professor Buckley receives Center for Musculoskeletal Research Pilot Grant**  
Professor Mark Buckley has received pilot funding from the University of Rochester Center for Musculoskeletal Research (CMSR) for his project titled, "The Influence of Chondrocyte Mechano-protective Adaptation on the Progression of Osteoarthritis." Osteoarthritis (OA) – a painful and complex joint disease

characterized by progressive degeneration of articular cartilage and surrounding tissues—is among the leading causes of disability in the United States. Yet, there are no FDA-approved treatments proven to stop or reverse OA and preserve joint health, suggesting that novel targets for OA interventions are needed. In preliminary studies, Professor Buckley found that cartilage cells (chondrocytes) have an inherent ability to adapt to the sustained mechanical forces that they experience during running and other activities. We refer to this phenomenon as cytoprotective adaptation to mechanics stimuli (CAMS). Since cell death and abnormal cell activity in response to mechanical forces are thought to play a role in the development of OA, enhancing CAMS may help to slow or prevent OA. As a first step towards their long term goal of developing translatable therapies that protect cartilage from degeneration through stimulation or enhancement of CAMS, they seek in this project to use a mouse model to determine how CAMS influences long-term degenerative changes in the knee after an in vivo injury.

**Professor Waugh awarded STTR with SiMPore, Inc.**  
Professor Rick Waugh has been awarded a subcontract with SiMPore, Inc. for his research project titled, "Microfabrication-based Biomimetic Approach for In Vitro Red Blood Cell Maturation." The overall goal of this proposal is to develop systems for efficient ex vivo maturation of functional human red blood cells (RBCs), which holds tremendous potential for addressing supply bottlenecks for delivering new therapeutic



options to chronically transfused patients with severe alloimmunization and for novel strategies for delivering therapeutics via engineered RBCs. No approaches developed so far have shown the ability to produce both enucleated and mature RBCs that have reliable shelf-life in storage or viability upon transfusion. Their hypothesis is that in existing culture systems, late stage erythroblasts/early

reticulocytes lose too much surface area during enucleation and membrane remodeling, leading to more spherical cells that are susceptible to hemolysis. They propose a biomimetic approach wherein cells are passed through microslit filters to recapitulate in vivo mechanical deformations that appropriately constrain cell area/volume, promote proper biconcave disc morphology and limit potentially harmful extensional stretching.

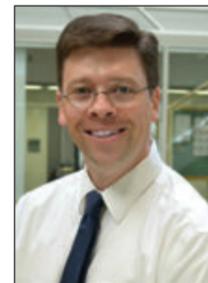


**Professor McGrath receives NSF funding for research collaboration with RIT and SiMPore, Inc.**  
A collaborative project including Rochester Institute of Technology, SiMPore, Inc., and BME Professor Jim McGrath titled, "Development of Ultrathin Nanomembranes for Home-based Hemodialysis," has received National Science

Foundation funding. This collaboration between UR, RIT, and SiMPore, Inc. continues the development of large area silicon nanomembranes for wearable hemodialysis. The high efficiency of the ultrathin nanomembranes enables new form factors for hemodialysis that can dramatically improve both quality of life and health outcomes for those with end stage renal failure.



Figure: Concept of a compact extracorporeal dialysis system enabled by silicon nanomembranes



**Stephen McAleavey receives grant from Department of Defense**  
The Department of Defense Office of the Congressionally Directed Medical Research Programs has awarded Professor McAleavey

a grant for his project titled, "Assistive and Autonomous Breast Ultrasound Screening: Improving PPV and Reducing RSI." Professor McAleavey's objective is to demonstrate that the synergistic combination of an anthropomorphic robotic arm, providing precision transducer positioning and force measurement, can enable high-resolution viscoelasticity and nonlinear modulus imaging to provide additional lesion classification features to improve PPV. He and his co-investigator, Professor Tom Howard (ECE) will implement a sonographer-guided, anthropomorphic robotic arm to position the transducer, set and maintain controllable pressure in spite of patient cardiac and respiratory motion, and implement shear wave and strain imaging methods that are currently impractical in vivo with hand-held ultrasound transducers.



**Ed Brown receives NIH grant**  
Professor Edward Brown has received NIH funding for his research project titled, "Using Second Harmonic Generation to Predict Metastatic Outcome in Colon Adenocarcinoma." Professor Brown previously discovered that an optical scattering phenomenon from primary tumor samples provides an independent

prognostic indicator of time to metastasis in colon cancer patients. "With this grant we will explore if and how this technique can be used to improve prediction of outcomes for individual patients, leading to improved therapy decisions," Professor Brown says.



**Professor Jong-Hoon Nam receives National Science Foundation funding**  
Professor Jong-Hoon Nam has received funding from the National Science Foundation (NSF) for his research project in collaboration with Professor Douglas Kelley, entitled, "Mechanically-facilitated Cochlear Fluid Homeostasis." Different types of hearing loss/difficulty are ascribed to imbalance of two lymphatic fluids

in the cochlea. Operating like an electrochemical battery, the cochlea is partitioned into three compartments filled with the lymphatic fluids. The separation of the two fluids provides an electric potential of approximately 80 mV that is crucial for hearing. To transduce sounds into neural impulses, there exists constant leaking (depolarizing) currents between the two fluid spaces through the sensory epithelium called the organ of Corti. Supporting cells in the organ of Corti must transport ions to maintain the electric potential. According to current theory, cochlear fluid homeostasis is responsible for the loss of auditory receptor cells (hair cells). Professors Nam and Kelley propose to examine the converse of the current theory: they hypothesize that the mechanical feedback of auditory receptor cells facilitates the maintenance of cochlear fluid homeostasis.

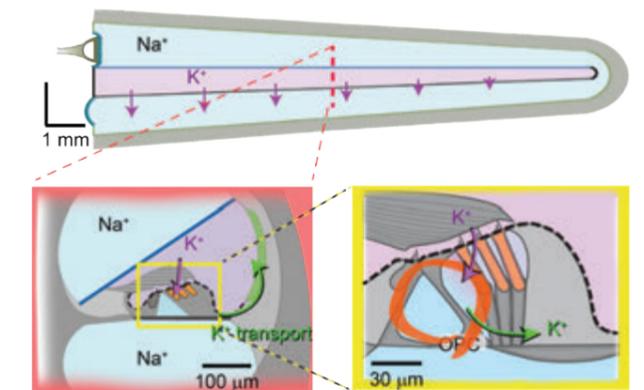


Figure 1: (Top) The cochlea is a long slender cavity filled with two different types of lymphatic fluids abundant in Na<sup>+</sup> and K<sup>+</sup>, respectively. Figure 2: (Bottom left) Mechano-transduction currents are mostly carried by K<sup>+</sup> ions, and the ions must be cleared for cochlear fluid homeostasis. Figure 3: (Bottom right) The focus of this project is the K<sup>+</sup> transportation along the circled micro-fluid space. Profs. Nam and Kelley hypothesize that the orange colored cells are cellular actuators to facilitate the ion transportation.

# funding news cont.



## Professor McGrath receives NIH funding for collaborative research project with the University of Ottawa

Professor Jim McGrath has received funding from the NIH for his research project, "Solid-State Nanopores Integrated with Nanoporous Membranes for Enhanced Single-

Molecule Counting of Low-abundance Biomarkers," in collaboration with the University of Ottawa. This project aims to create robust biosensors by combining a University of Ottawa technology for the electrical detection of individual DNA molecules with University of Rochester's nanomembrane technology. The porous nanomembranes serve as protective filters for the DNA sensors and prevent large molecules and debris from reaching the biosensor while still allowing the unobstructed passage of DNA. The technology will be used in a strategy in which designer DNA 'barcodes' serve as amplified surrogates for low abundance biomarkers present in biological fluids.

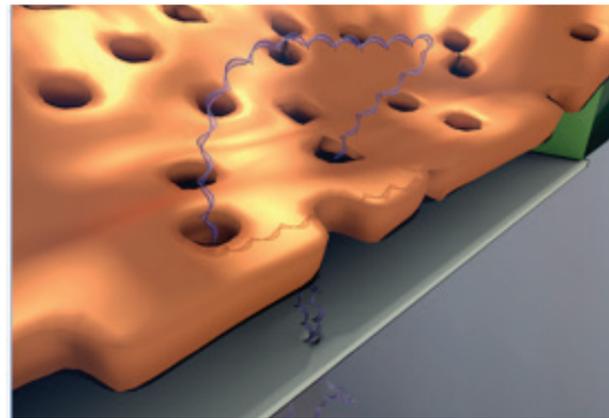


Figure: Nanoporous Nitride nanomembrane used as a pre-filter for a DNA biosensor



## Scott Seidman receives grant for clinical research and data analysis from Johnson & Johnson

Professor Seidman has received a grant for clinical research and data analysis from Johnson & Johnson for his research collaboration with Professor James Auavella of Ophthalmology. The project is titled, "Assessment of Eye Strain

Using Electromyography of Orbicularis Oculi Muscle." Following milestone review of the reanalysis of EMG data from orbicularis oculi muscle provided by Johnson and Johnson, investigators will design, and implement, and test a system to assess eyestrain. The system will have the highest likelihood for establishing a robust relationship between EMG activity and eyestrain resulting from inaccurate correction astigmatism. A protocol for using this system and a user interface supporting this protocol will also be developed. The system and protocol will be tested in 10 individuals recruited from the student population at the University of Rochester.



## Danielle Benoit is co-PI on new NIH grant

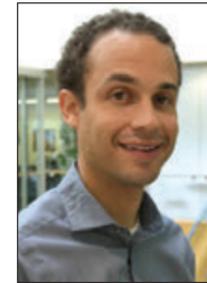
In collaboration with Associate Professor Catherine Ovitt of the Department of Biomedical Genetics, Professor Benoit is the co-PI on the recently funded NIH research project: "Salivary Gland-specific Radioprotection." Briefly, salivary glands are extremely sensitive to ionizing radiation (IR) used as a

curative treatment for head and neck cancers. However, mechanisms governing radiation-damage induced losses in salivary gland function is unknown. Therefore, this work focuses on the quality of life for survivors of head and neck cancer.

## Ed Brown and Catherine K. Kuo receive grant from Department of Defense



The Department of Defense office of the Congressionally Directed Medical Research Programs has awarded Professor Edward Brown and Professor Catherine K. Kuo a grant for their research project titled, "Understanding the Role of Matrix Microstructure in Metastasis." The goal of this project is to evaluate molecular mechanisms underlying the ability of an optical scattering phenomenon to predict metastatic outcome in patient samples.



## Mark Buckley receives NIH funding

Professor Mark Buckley has received an NIH R01 grant for his project, "Modulation of Insertional Achilles Tendinopathy by Multiaxial Mechanical Strains." Insertional Achilles tendinopathy (IAT) is a common and painful disease that responds poorly to conservative (i.e., non-operative) care. Improved outcomes for IAT patients

require interventions that target its fundamental cause. Thus, this study aims to elucidate the patterns of mechanical strain (i.e., deformation) that cause and reverse IAT in vitro, and determine how to induce these strain patterns in vivo through exercise-based physical therapy. The findings of this study will motivate effective, targeted non-surgical therapies for IAT. Collaborators for this project include Alayna Loiselle (Orthopaedics and CMSR), Michael Richards (Surgery), Sam Flemister (Orthopaedics), John Ketz (Orthopaedics) and Tongtong Wu (Biostatistics).



## Scott Seidman receives Wadsworth C Sykes Engineering Faculty Award

Professor Seidman has received the Wadsworth C Sykes Engineering Faculty Award from the University of Rochester Hajim School of Engineering and Applied Sciences. The award is intended to help in developing a new online course in the Hajim School called "Interfacing Concepts for Microcontrollers."

# new appointment



## Professor Rick Waugh named interim dean for arts, sciences & engineering

Rick Waugh, former BME chair, and a biomedical engineer with more than 35 years of academic and leadership appointments at the University of Rochester, will serve as interim dean for arts, sciences and engineering. Professor Waugh joined the Rochester faculty in 1980, beginning a 35-plus-year tenure as a teacher, researcher, and administrator. The founding chair of the Department of Biomedical Engineering, he is credited with overseeing the launch of what is now one of Rochester's fastest-growing and most popular majors. As a scientist, he has been widely recognized for his study of cell and membrane mechanics and the structural basis for the mechanical behavior of cells and membranes. Since 2013, he has served as a leader in efforts to expand research initiatives and funding, as well as Rochester's prominence among the nation's research universities.

# new patents

## New Patent Issued for Ultrasound Technology



The patent titled "Ultrasound Technology to Control the Spatial Organization of Cells and Proteins in Engineered Tissues" (US 9,688,962) has recently been assigned to the University of Rochester with inventors Diane Dalecki, Ph.D., Denise C. Hocking, Ph.D., and Kelley Garvin, Ph.D. The patent describes novel technology that uses acoustic forces within ultrasound standing wave fields to pattern cells volumetrically and engineer three-dimensional blood vessel networks within hydrogels. Primary applications of this technology include engineering vascularized tissue models for drug testing, tissue engineering, and regenerative medicine. The technology is a result of a multidisciplinary collaboration between faculty members of the Rochester Center for Biomedical Ultrasound, Diane Dalecki (BME) and Denise Hocking (Pharmacology and Physiology) and their former doctoral student Kelley Garvin.



## New patent issued for Professor Hocking

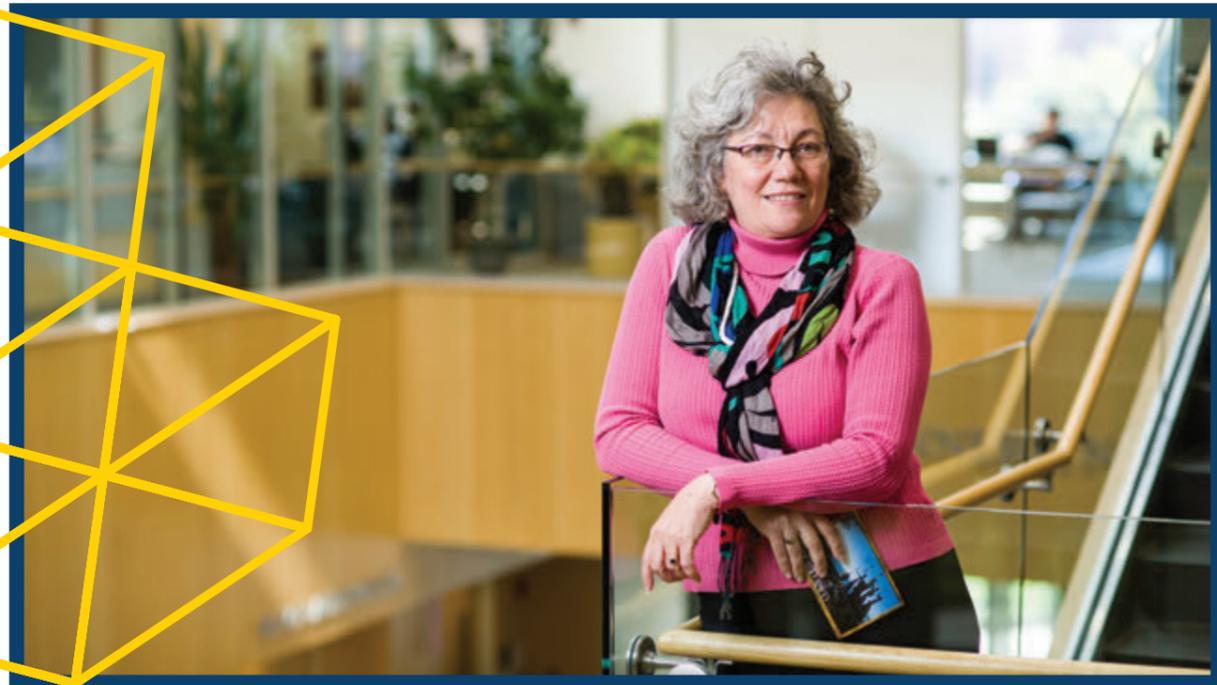
The patent titled "Chimeric Fibronectin Matrix Mimetics and Uses Thereof" (U.S. Patent No. 9,572,869; awarded February 21, 2017) has recently been assigned to the UR with inventors Denise Hocking, Ph.D. (Pharmacology and Physiology, BME, RCBU) and Daniel Roy, Ph.D. (BME B.S.'06, Ph.D.'12). The patent relates to the use of recombinant fibronectin-based peptides for wound healing and tissue regeneration applications. The technology falls under a new and exciting class of therapies known as wound biologics. The primary commercial application for this technology is to promote healing of hard-to-heal or chronic wounds, including diabetic, venous, and pressure ulcers, which impose a significant health care burden worldwide. Topical application of fibronectin matrix mimetic peptides to full-thickness excisional wounds in diabetic mice accelerates wound closure and promotes granulation tissue deposition, remodeling, and re-vascularization. Denise Hocking is a Professor of Pharmacology and Physiology and of Biomedical Engineering. Daniel Roy is a Scientist at KeraNetics, LLC, a biotechnology company located in Winston-Salem, North Carolina.

## Diane Dalecki and Denise Hocking receive UR Technology Development Fund Award



Professor Dalecki and Professor Hocking, (Pharmacology and Physiology, BME graduate faculty) received funding from the UR Technology Development Fund for their project titled "Ultra-collagen for Enhanced Wound Healing." The project aims to advance an ultrasound-based technology to direct collagen fiber microstructure and enhance the bioactivity of collagen hydrogels. Applications of this technology include fabrication of collagen-based wound dressings that promote healing of chronic wounds.

## Amy Lerner receives Goergen Award for Excellence in Undergraduate Teaching



Professor Amy Lerner is one of three recipients of the Goergen Award for Excellence in Undergraduate Teaching this year. This award aims to acknowledge the full scope of work that contributes to excellence in undergraduate education. It is given for distinguished teaching in large introductory courses or advanced seminars. In addition to being given for superior classroom performance, it recognizes innovation in course design or teaching methods.

Professor Lerner was nominated by BME Chair Diane Dalecki and chosen by Richard Feldman, dean of the College; Gloria Culver, dean of the School of Arts and Sciences; and Wendi Heinzelman, dean of the Hajim School for Engineering and Applied Sciences. She was presented with the award by her former student Alex Kotelsky during a special ceremony in the the Hawkins Carlson Room in Rush Rhees Library on October 5. Two other longtime professors, Beth Jörgensen and Bradley Nilsson, also received the honor.

"Beth Jörgensen and Bradley Nilsson and Amy Lerner exemplify all that we strive for in the College," Feldman says. "These recipients of the Goergen Award are all extremely accomplished scholars. Yet in addition to their research, they also excel as teachers. In interestingly different ways, they've all committed to working with students, providing guidance, and connecting them to resources, often spending significant amounts of time outside of the classroom to help them succeed."

Amy Lerner earned her MSE and PhD in mechanical engineering at the University of Michigan. In 1997, she joined the Departments of Mechanical Engineering and Orthopaedics and served as a core faculty member in the biomedical engineering program. Once the Department of Biomedical Engineering was established in 2000, she maintained her role as associate professor and later assumed the role of academic director of the Center for Medical Technology and Innovation. As a leader in biomedical engineering, Professor Lerner's exceptional work both in and out of the classroom exemplifies her passion for the field, and she continues to foster that same passion in her students.

Professor Lerner has been instrumental in the development of the biomedical engineering curriculum. She created and implemented the capstone senior design courses that provide students with real-life design projects. Each year, Professor Lerner partners with customers from both local communities and larger national companies in order to provide her students with projects that require them to solve real-life engineering design problems that they might encounter once in the field. In order to support her students throughout these projects, she has designed a series of assignments and milestones that work to guide students through challenges and stimulate creative problem solving. This unique exposure to professional engineering work, coupled with consistent classroom support, gives students the opportunity to hone the skills needed to enter the workforce prepared and confident in their abilities.

*"Professor Lerner's teaching style and influence on students is unmatched. Her ability to connect with influential external industry partners and integrate lessons learned and guidance into the classroom extended our learning from a purely academic endeavor to a way for us to see how our work could impact the broader world."*

*-Breana Roides, former student*

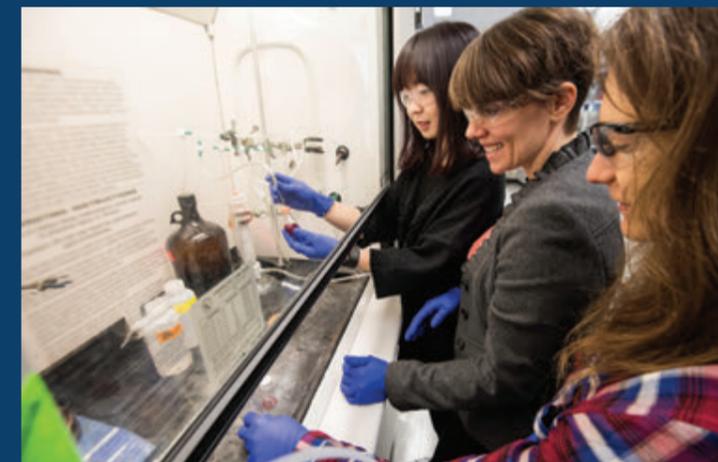
## Danielle Benoit is Rochester's "Young Engineer of the Year"

Each year, Danielle Benoit leaves her Therapeutic Biomaterials Lab at the University of Rochester to host the Annual Benoit Laboratory Lemonade Stand at the Rochester and Brighton public markets. Benoit and her students serve lemonade and explain their work on childhood cancer therapies as part of a national effort organized by Alex's Lemonade Stand Foundation, which has helped fund her research.

"Most people don't realize that treating cancer in children is much different from treating cancer in adults," says Benoit, associate professor of biomedical engineering. "At the same time, funding for childhood cancer research is woefully miniscule, compared to the money that goes into studying adult cancers." Benoit's community outreach is one reason she is the recipient of the 2016 Young Engineer of the Year Award from the Rochester Engineering Society. The award recognizes outstanding achievement in and contributions to the profession by young engineers in the Rochester region and promotes the importance of engineering practice to society. Benoit, who joined the University in 2010, is an international leader in developing therapeutic biomaterials with applications in bone and salivary gland regeneration and treating dental caries and childhood cancers.

Her work is creative, and transformative," says Diane Dalecki, chair of the Department of Biomedical Engineering. "She is a true and creative engineer, applying principles of classical chemical engineering and materials science to new biomedical applications in medicine." This has resulted in numerous patents; several federal, state, foundation and industry grants – including a prestigious National Science Foundation Faculty Early Career Development (CAREER) Award – and such professional awards as the 2015 Young Innovator Award in Cellular and Molecular Bioengineering.

Benoit also is "an outstanding educator, dedicated to training the next generation of engineers," Dalecki says. Benoit teaches a core biomaterials course for undergraduates and courses in biomaterials and drug delivery for graduate students. She annually mentors students working on senior design projects and undergraduates who participate as Xerox fellows in a summer research program. "Danielle is an outstanding faculty member, whose research in new biomaterials will have a large impact on therapeutics for a number of diseases and whose teaching and service demonstrate her dedication to the educational and outreach missions of the Hajim School," says Wendi Heinzelman, dean of the school.



Danielle Benoit, in her lab with PhD students Yuchen Wang (left) and Maureen Newman (right).

## Kevin Parker named fellow of National Academy of Inventors



Kevin Parker, William F. May Professor of Electrical and Computer Engineering, whose discoveries have been widely applied in medical imaging and image processing, has been named a fellow of the National Academy of Inventors. Professor Parker joins 174 other new NAI fellows this year who have "demonstrated a highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development, and the welfare of society," said Paul Sanberg, president of the academy. Professor Parker is the first fellow to be named from the University of

Rochester. He holds or shares 25 U.S. and 13 international patents with a range of applications. Blue noise mask, which Parker invented with then graduate student Theophano Mitsa '91 (PhD), is a widely adopted half-toning technique that prints shades of gray in less time and at a higher quality than traditional methods; it has been licensed by more than a dozen companies, including Hewlett Packard. It has generated more than \$54 million in royalties for the University, one of the three most lucrative inventions in the University's history.

*"Kevin's inventions have made significant contributions to printing, diagnostics, and imaging and have had incredible impact on people's lives. Being named a fellow of the National Academy of Inventors is a well-deserved honor for someone who has devoted his career to innovation that has changed the world."*

*-Wendi Heinzelman, dean of the Hajim School*

# department news

## ORS Upstate New York & Northeast Regional Symposium hosts over 200 at University of Rochester



Top image: Symposium attendees; Bottom image: back, (from left to right) Diane Dalecki (UR BME Chair), Farshid Guilak (Wash U), Hani Awad (UR BME, Ortho, CMSR), Eddie Schwarz (UR CMSR Director, Ortho), front (from left to right) Mike Zuscik (UR CMSR, Ortho), Catherine K. Kuo (UR BME, Ortho, CMSR)

The Orthopaedic Research Society (ORS) Upstate New York and Northeast Regional Symposium was held at the University of Rochester July 27-28. ORS Ambassador and Associate Professor Catherine K. Kuo, organized the event which was held in conjunction with the 7th Annual University of Rochester Center for Musculoskeletal Research (CMSR) Annual Symposium. The event was a great success, with approximately 200 people in attendance representing 24 institutions in the regional area. The Department of Orthopaedics and the Department of Biomedical Engineering generously supported the symposium. Highlights included:

- Inspirational keynote talk from Dr. Farsh Guilak, ORS Past-President, Washington University in St. Louis
- Podium presentations from the University of Rochester CMSR Rosier Award finalists
- Interactive and innovative poster sessions featuring ORS Poster Award finalists and presenters of accepted abstracts
- Networking opportunities throughout the symposium including the awards banquet, poster sessions
- Diverse career development panels
- Educational and inspiring presentations from Dr. Michele J. Grimm, Program Director, National Science Foundation, and Dr. Fei Wang, Program Director, NIH, NIAMS

## Graduate Program Coordinator Donna Porcelli receives Witmer Award for Distinguished Service

BME Graduate Program Coordinator Donna Porcelli has been honored with the Witmer Award for Distinguished Service, which is reserved for staff members who have demonstrated significant and longstanding contributions to the University.

After joining the University in 1976 as a secretary in the Department of Chemical Engineering, Donna built a reputation for being a loyal, honest, and “extremely knowledgeable” resource for students and faculty in the department. When she moved to the Department of Biomedical Engineering in 2001, that reputation continued to grow.

“Donna has been on our administrative staff since the beginnings of our BME department, and her outstanding dedication and talent have been key to our growth and success,” says Diane Dalecki, Distinguished Professor and chair of the Department of Biomedical Engineering. “As our BME Graduate Administrator, Donna has guided every BME graduate student through our program, and assisted each BME faculty member with their graduate students and graduate education endeavors. Donna has contributed in countless ways to our department, always with the utmost expertise, professionalism, enthusiasm, and genuine concern for best outcomes for our students, faculty, and staff. There is no one more deserving of a Witmer Award for Distinguished

Service than Donna and we are delighted that she has been recognized with this honor.”

In her current position, Porcelli plays a key role in graduate admissions and recruiting activities for the department.

Colleagues say she has touched the lives of countless graduate students in biomedical engineering over the years, and has helped them be successful.

“Donna’s dedication to the University’s mission and values can be summed up by her diligent and tireless work ethic, which has made her a rock for our department,” writes Hani Awad, professor of biomedical engineering and chair of the department’s graduate committee. “Donna is willing to do whatever it takes to support our graduate program.”

Donna was honored with a reception in Helen Wood Hall and her name will be inscribed on a plaque in the Medical Center as well as in Wallis Hall on the River Campus.



## 2009 Alum Andrew Bochenko hosts “Career Conversation”



Andrew Bochenko met with BME undergraduates and CMTI graduate students to describe his career path and current position as a product manager for Bigfoot Biomedical. Andrew had an interesting perspective to share, based on several internships, several years at Medtronic, and his current position where he is helping to launch exciting new technology focused on using smart phone technology to help patients with Type I diabetes manage their condition. It was fascinating to hear his comparison of life at Medtronic – the largest medical device company in the world – to working

at Bigfoot Biomedical, which now has 26 employees. It was a great opportunity to hear what he has learned about the advantages and disadvantages of big and small companies. Andrew shared some great advice and introduced us to colleagues at the University of Rochester Center for Clinical Innovation. We wish Andrew and his colleagues at Bigfoot great success on their clinical trials!

*The BME Department regularly invites our alums to host “career conversations” either in person or via Skype. If you are interested in sharing your professional experience with our students, contact Amy Lerner at amy.lerner@rochester.edu.*

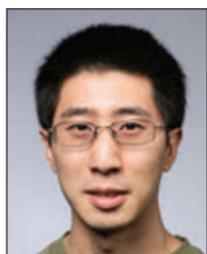
# student fellowships & scholarships



## Ken Sims receives NRSA funding

Ken Sims, a PhD student working in the lab of Danielle Benoit, has received funding from the Ruth L. Kirschstein National Research Service Award (RRSA) Individual Predoctoral Fellowship program (F31). His project is titled, "Engineered pH-Responsive Nanoparticle Drug Delivery to Inhibit Oral Biofilm Formation," and addresses

the issue of tooth decay, which affects over two-thirds of children and nearly all adults worldwide and results in billions of dollars of direct and indirect healthcare costs each year. This research may lead to a new promising, clinically relevant therapeutic approach to prevent tooth decay and other oral diseases.



## BME Take 5 student wins Fulbright grant to study in Glasgow, Scotland

Congratulations to Jonathan Boualavong '16/T5'17 BME for winning a Fulbright grant. An Elkridge, Maryland, native, Jonathan will pursue an MPhil in chemical and process engineering at the University of Strathclyde in Glasgow, Scotland.



## Marian Ackun-Farmmer receives ASE Barnard Fellowship

Marian Ackun-Farmmer of the Benoit Lab has been selected for one of the Arts, Sciences and Engineering Donald M. and Janet C. Barnard Fellowships this year. Marian was recognized specifically for her strong research record as well as her commitment to mentoring, outreach and service to the

Department of Biomedical Engineering and her field.

## Jacob Kallenbach receives Edward Peck Curtis Award for Excellence in Teaching by a Graduate Student



Congratulations to PhD candidate Jacob Kallenbach who was awarded the prestigious Edward Peck Curtis Award for Excellence in Teaching by a Graduate Student. Jacob was nominated by Professor Ian Dickerson for his service as a Teaching Assistant for his course, BME411-Cell and Molecular Biology, in the Fall of 2016." Jacob was always well prepared with the course material, had a friendly manner, and was able

to engage the students and help them learn the material," said Professor Dickerson. "The BME411 class did very well this year, and their success is due in large part to Jacob's outstanding performance as a Teaching Assistant. He ranks as one of the best TA's I have worked with over the past 20 years."

## Marian Ackun-Farmmer receives AfterCollege Engineering Student Scholarship



Marian Ackun-Farmmer, a biomedical engineering student in the lab of Danielle Benoit, is the recipient of an AfterCollege Engineering Student Scholarship. Founded in 1999, AfterCollege, Inc. ( www.aftercollege.com) is an online professional platform that connects students, faculty, alumni and employers through customized career networks at colleges and professional organizations across the country.



## Eva Hansen receives prestigious scholarship from Astronaut Scholarship Foundation

Eva Hansen, an undergraduate in the Benoit Lab, has been selected by the Astronaut Scholarship Foundation (ASF) to receive \$10,000 in scholarships this academic year. Eva is one of just 40 students selected nationwide this year for the honor. She was chosen based on her unique aptitude for research

and ingenuity in science and technology, as well as exemplary academic performance. Eva's research involves drug delivery approaches to protect healthy tissue from the effects of radiation, as experienced in cancer therapy and in travel beyond low Earth orbit.

# student awards & honors



## Tristan Ford wins New York State College Health Association's 2017 Outstanding Student Award

Congratulations to BME senior Tristan Ford who is recipient of the New York State College Health Association's 2017 Outstanding Student Award for his contributions to the health and safety of college students at our University, and at the state and national level. Tristan led the efforts to gain student support

for our University to become tobacco-free.



## Andrew Shubin receives commendation for PhD Dissertation

Andrew Shubin, a 2017 PhD graduate in the Benoit Lab, has received commendation in the Outstanding Dissertation Award Competition for Engineering. His PhD research project is titled, "Poly(ethylene glycol) Hydrogels for Salivary Gland Regeneration."

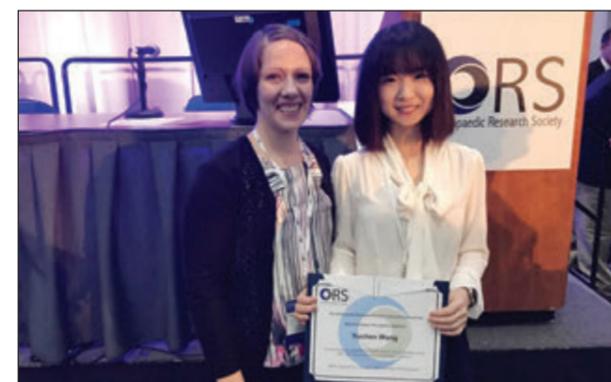


## Ge Song receives President's Award

Congratulations to BME senior Ge Song who received a President's Award for "Adaptive Optics Scanning Light Ophthalmoscopy for Retinal Imaging and Vision Disease Detection." Ge was presented with the award at the University of Rochester Undergraduate Research Exposition, in which students presented work

addressing a variety of subjects within the humanities, engineering, natural sciences, and social sciences.

## Yuchen Wang wins New Investigator Recognition Award at ORS Annual Meeting



Yuchen Wang, a graduate student in the Benoit Lab, has won a New Investigator Recognition Award. Yuchen was presented with the award at the Orthopaedic Research Society (ORS) Annual Meeting in San Diego, California for her project titled, "Delivery of  $\beta$ -Catenin Agonists via Targeted Nanoparticles to Enhance Fracture Healing." Co-authors for this research were Michael Baranello, Maureen Newman, Tzong-Jen Sheu, J. Edward Puzas and Danielle Benoit.



## Kilean Lucas wins Falling Walls Competition

Kilean Lucas, a PhD student in the lab of James McGrath, professor of biomedical engineering, took first place in the University's third annual Falling Walls competition, earning him a \$500 prize and an all-expenses paid trip to Berlin, Germany this fall to represent Rochester in the international Falling

Walls competition. Kilean described how nanomembranes developed in the McGrath lab can be used to filter out telltale

exosomes (small, cell-derived vesicles) from the blood to provide early detection of cancer

## Omar Soufan competes in Hult Prize entrepreneurial competition



Omar Soufan (left) pictured with his teammates on Team Meliora

BME student Omar Soufan was among six finalist teams at the Hult Prize regionals in San Francisco early this month. The Hult Prize is the largest social entrepreneurship competition in the world and is co-sponsored by the Hult International Business School and the Clinton Global Initiative. The Rochester students who presented as Team Meliora were Edgar Alaniz '17, Carlos (Yuki) González '17, Ibrahim Mohammad '17, and Omar Soufan '17. The team's startup company, Meliora Homes, will build homes for refugees from recycled plastics.

## CMTI students win 2017 America's Got Regulatory Science Talent Competition

At the Fourth Annual "America's Got Regulatory Science Talent" competition, hosted as part of the CTSI Regulatory Science programs, eight teams of students competed for a chance to present their ideas on how to solve regulatory science issues in person at the Food and Drug Administration. Each team delivered a five-minute presentation proposing novel solutions to address challenges in the nine scientific priority areas outlined in the FDA's Strategic Plan for Advancing Regulatory Science. This year's first and second place winners were all graduate students receiving biomedical engineering masters degrees through the Center for Medical Technology & Innovation (CMTI).

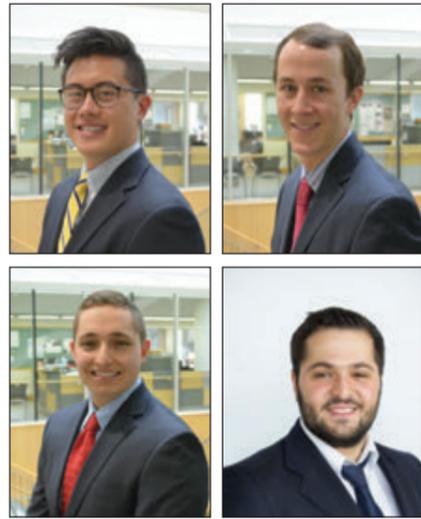


First place: Simple English Explanation Directive (SEED) Bethany Lennox, CMTI graduate student (left)

Second place: 3-Defining Patient Matched Implants Kerry Donnelly, CMTI graduate student (middle) and Brittany Garrison, CMTI graduate student (right)

# student awards & honors cont.

## Four BME students among winners of 11th Annual Mark Ain Business Model Competition



Pictured: (top left) Chandler Woo, (top right) Connor McBride, (bottom left) Edward Ruppel, (bottom right) Omar Soufan

In unprecedented circumstances, two teams tied for first place at the Mark Ain Business Model Competition. They split the first and second place cash prizes (totaling \$7,500 each) and each will be offered space in the University of Rochester Student Incubator at High Tech Rochester. First place winner Proteus Medical developed a novel endoscopic foreign body

retrieval device for the veterinary space. The team was comprised of three BME students – Connor J. McBride '17, Edward F. Ruppel '17, and Chandler W. Woo '17. Also in first place, Team Meliora plans to rebuild the lives of refugees by providing them with durable, affordable, and beautifully-designed homes made from post-consumer recycled plastic. The group is comprised of four undergraduate students, one of which is a BME student, Omar Soufan '17. The other students are Edgar Alaniz '17, Carlos Yuki Gonzalez '17, and Ibrahim Mohammad '17.

## Three BME seniors win Hajim School Awards



Pictured: (from left to right) Justin Schumaker, Runxuan (Sophia) Zhao, Edward Ruppel

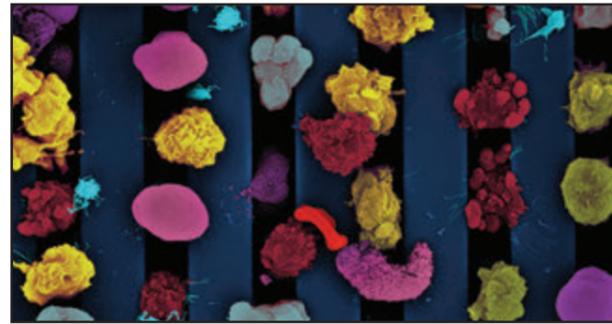
Congratulations to the following biomedical engineering seniors who were Hajim Award winners this year: Justin Schumaker and Runxuan (Sophia) Zhao both received the Donald M. Barnard Prize, awarded to junior or senior engineering students on the basis of personal qualification and achievement; Edward Ruppel received the G. Harold Hook Prize for demonstrating outstanding interest in engineering.



## Kilean Lucas takes second place at the Hajim School's Art of Science Competition

The goal of the Art of Science Competition is to explore and illuminate the aesthetic beauty that results when science, art, and technology intersect. Kilean Lucas, a PhD candidate in the lab of James McGrath, won second place

for his submission titled, "Blood Cells by Scanning Electron Microscope." The image features a single human red blood cell, captured among several white blood cells on a silicon nanomembrane. Lucas is studying how the ability of these nanomembranes to separate and filter out particles that differ by mere microns in size could lead to medical breakthroughs. For example, immature red blood cells separated from mature red blood cells could be harvested and seeded into bioreactors as a new way to replenish blood banks. He hopes this image will convey to people how "stunning it is, in and of itself, that we're able to capture all of these cells out of blood, a very complex solution, in ways that could change peoples' lives."



Kilean's winning image titled, "Blood Cells by Scanning Electron Microscope"

## Three BME graduate students receive 2016 CMSR Symposium Distinguished Abstract Awards



Pictured: (from left to right) Bentley Hunt, David Abplanalp, Maureen Newman

Three BME students were selected to receive a CMSR Symposium Distinguished Abstract Award this year. This new award recognizes outstanding abstracts that were submitted for this year's poster session. David Abplanalp and Bentley Hunt are both members of the Awad Lab and Maureen Newman is a member of the Benoit Lab.

## Three BME seniors inducted into Phi Beta Kappa honor society



Pictured: (from left to right) Nathaniel Barber, Claire Kaiser, Justin Schumacher

Congratulations to BME seniors Nathaniel Barber, Claire Kaiser, and Justin Schumacher who were recently inducted into Phi Beta Kappa, the nation's oldest and most prestigious academic honor society!

## Maggie Thomas Freeberg receives Randy Roiser Award at CMSR Symposium



Maggie Thomas Freeberg (left) pictured with Professor Hani Awad (right)

Congratulations to Maggie Thomas Freeberg of the Awad Lab who received the Randy Roiser Award at the Annual Center for Musculoskeletal Research (CMSR) Symposium in July. Her presentation titled, "Serpine1 loss of function improves flexor tendon healing in mice: Implications for therapeutic development" is associated with the flexor tendon tissue engineering project within the Awad Lab.

## Four BME students among winners of 2017 Charles and Janet Forbes Entrepreneurial Competition



Pictured: (from left to right) Edward Ruppel, Chandler Woo, Connor McBride

BME Seniors Connor McBride, Edward Ruppel, and Chandler Woo took second place for Proteus Medical. They designed a novel endoscopic retrieval device for removing objects that pets swallow. BME Senior Omar Soufan was part of the Meliora Homes team, which will build homes made from recycled plastics for the homeless and refugee populations. Omar's teammates included Edgar Alaniz (biochemistry), Carlos Gonzalez (financial economics), and Ibrahim Mohammad (mechanical engineering).

# Hajim School of Engineering & BME Department awards

BME GRADUATE STUDENT TA AWARD  
Kilean Lucas - BME 442

OUTSTANDING BME THESIS AWARD  
Andrew Shubin

BME SERVICE AWARD  
Jacob Kallenbach  
Melinda Vander Horst

MARYLOU INGRAM FELLOWSHIP  
Danielle Desa  
Clyde Overby

SPROULL FELLOW  
Maureen Newman

KAUFFMAN ENTREPRENEURIAL YEAR (KEY) SCHOLAR  
Syed Reefat Aziz

TAKE 5 SCHOLARS  
Arun Nambiar  
Brenna Schnell  
Janet Sorrells  
Shrenick Vohra

BME FACULTY AWARD FOR UNDERGRADUATE SERVICE  
Janet Sorrells

BME FACULTY AWARD FOR UNDERGRADUATE RESEARCH  
Breanna O'Reilly  
Edward Ruppel

BME FACULTY AWARD FOR TEACHING ASSISTANT  
Madeline Cappelloni

BME OUTSTANDING SENIOR  
Justin Schumacher

BME OUTSTANDING JUNIOR  
Tianyu Wu



# design day 2017

Each year, biomedical engineering students partner with companies and institutions to solve real world engineering problems through developing prototype medical devices and research instruments. We celebrate the culmination of our students' engineering education by hosting Design Day, wherein they present their projects. Both undergraduate seniors and graduate students enrolled in the Center for Medical Technology & Innovation masters program participate. We are grateful to our industry partners and collaborators for the opportunity to address their challenges. Their dedication to improving health care have inspired our students to apply, develop and demonstrate their creative talents and engineering expertise. Some examples of this year's projects are featured on these pages. For more information on a specific project, contact Amy Lerner at amy.lerner@rochester.edu.



## CMTI InstaTract Team

Ian Baranowski, Lauren Seitz, Meggie Ferrari, Kyle Meyers  
Our team is developing a novel atrial retraction device for use in minimally invasive heart valve surgery. Current atrial retractors have a significant learning curve and either create an extra incision through the chest wall and risk bleeding, or take up valuable space in the surgeon's field of view. The InstaTract is an intuitive and quickly deployable device that provides retraction of varying size atria, exposing the valve being repaired or replaced.

## Sepsis Detectis Team

Justin Schumacher, Brittany Schutrump, Dylan Latham, Kathleen Larson, Josh Schum-Houck  
Our team is working to combat the hospital mortality rates of sepsis by developing a faster detection technology. We aim to implement hyperspectral imaging as a non-invasive diagnostic tool for use within an intensive care unit. Instead of conducting cell cultures and blood tests, the goal of this device is to help detect and quantify the presence sepsis in minutes.



## Curbell Medical ECG Team

Madison Schumacher, Vladimir Tokarchuk, Connor O'Brien, Raiem Smith  
Hospital workflow is impeded by clinicians' need to change ECG systems as a patient moves throughout the hospital. We aim to modify Curbell Medical's existing ECG cable system in order to limit disruptions to clinical workflow and minimize the hospital's waste caused by discarding incompatible lead sets. The solution is a permanently attached, optimized cable-adaptor module which enables smooth navigation through hospital-identified critical pathways.



## S.T.A.R.S. Scoliosis Phantom Team

Andrew Arjana, Rebecca Amorese, Shamroz Farooq, Stephanie Kamau, Tongxi Zhuang  
Adolescent idiopathic scoliosis is a lateral deviation of the spine commonly associated with rotation of the vertebrae. The Scoliosis Phantom is a realistic model of the lumbar region of a scoliotic spine for an adolescent female patient suffering from idiopathic scoliosis. Our phantom will be a research tool to increase the repeatability and reliability of the brace-making process by reducing the number of brace fittings and X-Ray scans a patient will have to undergo.



## PALS: Pediatric Assisted Locomotion

Alex Kazmierczak, Nitish Sardana, Jolan Burger, Courtney Semkewyc  
We are working with local pediatric physical therapists to design a PT system to teach children with motor delays resulting from Down syndrome and cerebral palsy to walk. Children with motor delays learn to walk a year late on average, and because of this, tend not to hit developmental milestones on time. Our treadmill-based supportive gait trainer aims to teach them to walk earlier, giving them more independence and the capability to explore and learn about their surroundings.



# alumni updates

## Deborah Cooper



**Hometown:** Woburn, MA  
**Current city:** Rochester, NY  
**Degrees:** University of Rochester, BS, Biomedical Engineering, 2014  
 University of Rochester, MS, Biomedical Engineering, 2015 (CMTI)  
**Current position & company:**  
 I am a Product Applications Development Engineer at Transonic Systems, Inc. in Ithaca, NY. Transonic Systems is a leader in innovative biomedical measurement equipment for surgical, hemodialysis, pediatric critical care, and research applications. I interface between R&D and the clinical users of our devices in the pediatric critical care field. I support these clinicians in the ICU with technical, educational, and training support.  
**Why did you pick University of Rochester?** I picked the University of Rochester because of its flexibility in courses that I could take. The idea of focusing in on a cluster made a lot of sense to me rather than taking classes from all different departments outside of my major.

For graduate school, the CMTI Program provided exactly what I was looking for in terms of experience. The experience in medical device design and seeing real clinical needs in the operating room is what got me a great first job right after graduation.

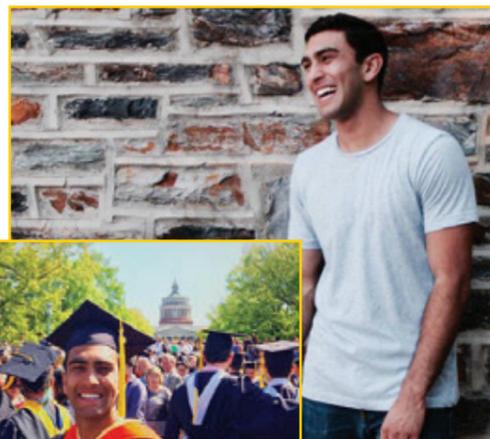
**Why Biomedical Engineering?** Biomedical Engineering seemed like a perfect fit since I liked both biology and math. I first focused on biomechanics, but then became interested more in biosignals after taking circuits. Biomedical engineering provided me with the opportunity to get into many different career paths. It is a versatile major that opens many doors.

## Jarvis D'Souza

**Hometown:** Powell, Ohio  
**Current location:** Kalamazoo, Michigan  
**Degrees:** University of Rochester, BS, Biomedical Engineering, 2015  
 Duke University, MS, Engineering Management, 2017  
**Current position & company:** R&D Design Engineer at Stryker, where I help design and develop surgical instruments for minimally invasive spine procedures.  
**Why did you pick University of Rochester?** The U of R gave me the opportunity to play on an accomplished Men's Varsity Soccer Team while studying in a high level engineering program. Both the team and the program encouraged and supported me in the task of balancing the two. I was drawn to the BME program because of the many opportunities it provided, with a range of classes and concentrations to choose from. Additionally, the BME administrative staff and professors were unlike any other program that I visited. I valued that each staff member truly cared about the growth and success of each student.

**Advice for current/future students:** Focus on getting work experience during your time in school. This does not have to be the ideal internship with your dream company, but any experience will help you get one step closer. Internships and other work experiences provide a huge benefit to students who want to work in industry. Companies see these as differentiators when looking at applicants. Take time to really explore and apply for internships and accept any opportunity that comes your way. Even if the position is not exactly what you want to do, you will gain invaluable industry experience and perhaps learn what you don't want to do.

**Words to live by/favorite quote:** "Everyone you will ever meet knows something you don't." I think about this quote in many different aspects of my life. It encourages me to learn from others and value the differences in



people. Everyone has different backgrounds and experiences that shape who they are, and these characteristics are what make every person valuable. Whether it be a team member, a personal relationship, a coworker, or a stranger with an opposing view, someone always has something valuable to add. I make it my focus to learn and understand the strengths of those around me and encourage what makes others unique.



## Meghan O'Donovan

**Hometown:** As an "Army Brat," I grew up all over the country and abroad.  
**Current city:** Cambridge, Massachusetts  
**Degrees:** University of Rochester, BS, Biomedical Engineering, 2009  
 University of Rochester, MS, Biomedical Engineering, 2010  
**Current position & company:** Biomedical Research Engineer with the Center for Military Biomechanics at the Natick Soldier Research, Development and Engineering Center (NSRDEC).  
**Why Biomedical Engineering?** It was the only engineering track where I felt I wouldn't have to give up my dual love for both Biology and Chemistry. Biomedical Engineering touches on so many other fields, I felt it was a way I could still pursue all of my interests.  
**Advice for current/future students:** Go to office hours. No really, GO TO OFFICE HOURS.  
**Favorite quote:** "Always remember that you are absolutely unique. Just like everybody else" - Margaret Mead  
**Where would you like to be in 5-10 years?** Is it strange to say that in 5-10 years I hope I am right where I am? I love my job, I love doing research for the Army, and I love living in New England. I guess winning the powerball lottery wouldn't hurt, Can I put that in a 5 year plan?  
**Hobbies:** Skiing, Hiking, and Writing. Partying with friends and family. Sleeping in on weekends.

## Courtney Astemborski

**Hometown:** Niskayuna, NY  
**Current city:** Greater Boston, MA Area  
**Degrees:** University of Rochester, BS, Biomedical Engineering, 2014  
 University of Rochester, MS, Technical Entrepreneurship and Management, 2015  
**Current position & company:** Project Manager at RNSights  
**Why did you pick University of Rochester?** I chose the University of Rochester because of the high academic caliber and interdisciplinary work being conducted on campus. I knew that I wanted to major in Biomedical Engineering and I liked that the medical center was in such close proximity for collaborative work. Also, the aesthetics and collegiate feeling that campus has was something I could not pass up. The University of Rochester felt like home after visiting campus while in high school and I chose to apply early decision.  
**Advice for current/future students:** Work hard and know that you will always have the support of the University of Rochester community. While on campus, you are surrounded by the best and brightest faculty who have a strong passion for their work and who want to share that with you. The faculty and staff want you to succeed in your career and you should take advantage of the resources and network that you build while on campus throughout your career. Once you graduate and leave campus, no matter where you end up in the world, you are almost guaranteed to be able to connect with other University of Rochester alums so don't be afraid to connect and collaborate with them.  
**Words to live by:** Meliora -- I strive to make the world ever better!  
**Hobbies:** I am a member of the University of Rochester Boston Network Leadership Cabinet and the Junior League of Boston. I enjoy spin and yoga classes as well as skiing in the winter and going to the beach in the summer.



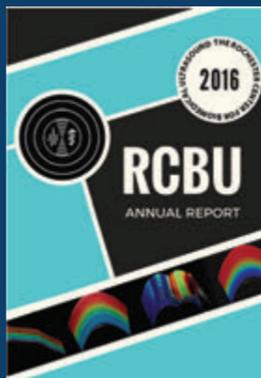
# RCBU

Rochester Center for Biomedical Ultrasound



The Rochester Center for Biomedical Ultrasound (RCBU) was created at the University of Rochester to unite professionals in engineering, medical, and applied science communities at the University of Rochester, Rochester General Hospital, and the Rochester Institute of Technology. Since its founding in 1986, the RCBU has grown over the years to nearly 100 members, with several visiting scientists from locations around the world. The Center provides a unique collaborative environment where researchers can join together to investigate the use of high frequency sound waves in medical diagnosis and therapy. The Center's mission encompasses research, education and innovation.

Interested in the RCBU?



Contact RCBU Director Diane Dalecki at [dalecki@bme.rochester.edu](mailto:dalecki@bme.rochester.edu) or visit [rochester.edu/rcbu](http://rochester.edu/rcbu) to learn more and request a copy of the 2016 RCBU Annual Report

# CMTI

Center for Medical Technology & Innovation



The Center for Medical Technology & Innovation offers a one-year masters degree in biomedical engineering specializing in medical device design. The program involves a 2-semester guided process in medical technology innovation and an 8-week clinical immersion program in clinical and surgical settings. One of the program's strengths is its close proximity to Strong Memorial Hospital, the largest hospital in Upstate New York. The CMTI is less than a 5 minute walk from the medical center, making it easy to interact with our clinician colleagues.

## What you'll learn

- Identify and evaluate unmet clinical needs
- Work with surgeons for concept design
- Market and intellectual property assessment
- FDA regulatory processes and quality systems
- Design and execute prototype tests
- Prototype clinical needs into scientifically proven concepts

## Ready to learn more?

Visit [cmti.rochester.edu](http://cmti.rochester.edu) for more information or to apply. Scholarships are available! Contact our team at [cmti@ur.rochester.edu](mailto:cmti@ur.rochester.edu)

centers within BME



## Degrees awarded

Dear BME Alumni,

Whether it's been a long time since BME 101 or just a few short years, I would be delighted to hear from you. Please keep me posted on all your successes!

Best,

Diane Dalecki,  
Chair of BME  
[dalecki@bme.rochester.edu](mailto:dalecki@bme.rochester.edu)

For more information on applying to one of our graduate programs, please contact Graduate Program Coordinator Donna Porcelli at [donna.porcelli@rochester.edu](mailto:donna.porcelli@rochester.edu) or 585.275.3891. To learn more about biomedical engineering at the University of Rochester, visit [www.bme.rochester.edu](http://www.bme.rochester.edu) and follow us on Facebook.

## MS

### October 2016

Dillon Badman  
Tucker Burgin  
Andrew Clark  
Yingye Fang  
Martin Gitomer  
Scott Harrienger  
Jean Fecteau  
Sam Kashtan  
Marlen Mahendraratnam  
Erica Marron

### March 2017

Luke Daily  
Khang Huynh  
Jacob Kallenbach  
Kilean Lucas  
Xuan Pan  
Kevin Schilling, Jr.  
Melinda Vander Horst  
Jiayi Zhou

## PhD

### August 2016

Andrew Shubin  
"Poly(ethylene glycol) Hydrogels for Salivary Gland Regeneration"

Kayleigh Miller  
Shwe Pyie  
Jingxuan Ren  
Tristan Richardson  
Angela Ryck  
Smruthi Sahukar  
Sarah Wayson  
Danielle Wilson  
Zhijin Wu  
Andrew Zeccola

### May 2017

Marian Ackun-Farmmer  
Ryan Hasselkus  
Marien Ochoa Mendoza  
Nathan Sowards

### March 2017

Eric Brown  
"Adaptive Properties of Human Reflexive Head Movements During Linear Motion"



UNIVERSITY *of*  
ROCHESTER