



DEPARTMENT OF  
BIOMEDICAL  
ENGINEERING  
AT THE UNIVERSITY  
OF ROCHESTER

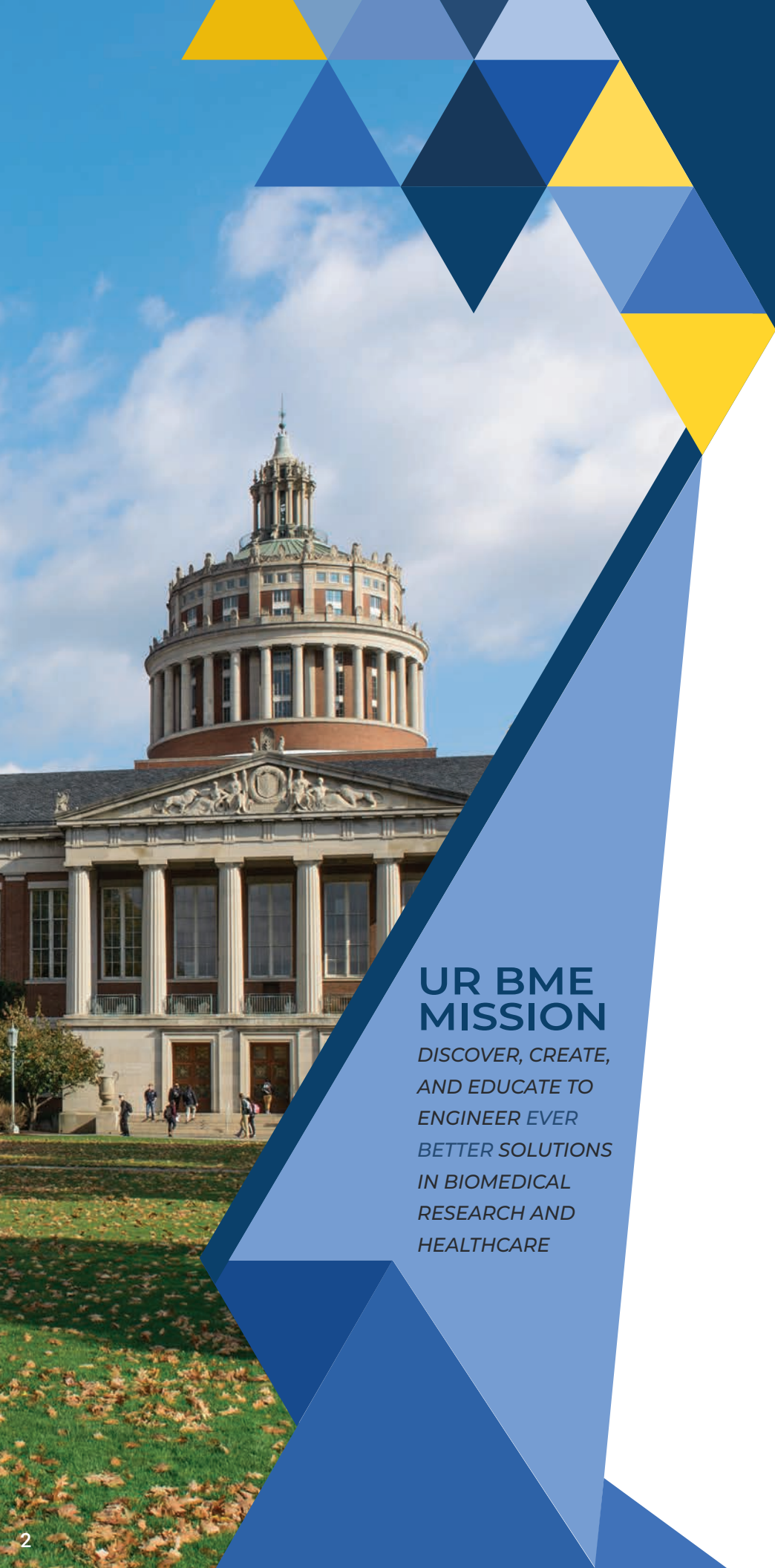
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FALL 2019



UNIVERSITY *of*  
ROCHESTER





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## UR BME MISSION

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

## 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 Diane Dalecki at [dalecki@bme.rochester.edu](mailto:dalecki@bme.rochester.edu).

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## on the cover

Shyanthony Synigal (3rd year BME PhD student) applies electroencephalographic (EEG) electrodes to Edgar Rodriguez (BME MS student) under the supervision of Dr. Edmund Lalor (Associate Professor, BME and Neuroscience). EEG data acquired in these experiments can be analyzed using engineering signal processing methods to extract useful information about how the human brain works. The Lalor lab focuses on studying how human brains sense, perceive, and pay attention to stimuli in their environment – especially the kinds of stimuli that humans encounter in daily life, such as speech and music. A better understanding of these processes in healthy humans is essential if we are to understand how those processes go awry in clinical populations. And better measurement of these processes will benefit the design of next generation devices such as smart hearing aids.

## 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
- Center for Advanced Brain Imaging and Neurophysiology

## research areas

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





## message from the chair

The Department of Biomedical Engineering at the University of Rochester was formally established in July 2000. As we approach the 20th anniversary of the founding of our department, 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.

The foundation of our BME department is our world class faculty. This year our BME faculty members had outstanding success in securing new funding for their groundbreaking research. Their successes include new grants from the NIH, NSF, and other agencies on BME topics including new microscopy techniques for pathology and surgical guidance, innovations in nanomembrane biosensors, biomechanical and mechanobiology approaches to understanding osteoarthritis, advances in multisensory processing and neuroengineering, biomechanics of vision correction techniques, and many other exciting topics (pages 18-21). Additionally, many of our faculty have developed productive industry partnerships to translate their research advances to commercial products and clinical practice.

I'm also delighted to share with you some outstanding honors of our faculty (pages 5-8). Three BME faculty members, Danielle Benoit, Catherine Kuo, and Amy Lerner, were elected into the College of Fellows of the American Institute for Medical and Biological Engineering (page 5). Jim McGrath received the Edmund A. Hajim Outstanding Faculty Award, and Amy Lerner was the recipient of a Presidential Diversity Award. Our BME faculty are also dedicated mentors. Mark Buckley and Laurel Carney received Kearns Faculty Mentoring and Teaching Awards, and Danielle Benoit was the recipient of the Undergraduate Teaching & Mentoring Award. This year marked important departures and additions to our BME staff as Donna Porcelli, our long-standing BME Graduate Coordinator retired, and Ania Dworzanski and Patrick Kingsley joined our BME team (pages 9 & 12).

Our talented BME students continue to garner many prestigious awards and honors (pages 13-15). BME undergraduate and graduate students have been recipients of new fellowships, won design and entrepreneurial competitions, and have been recognized with additional awards and honors. Be sure to also review some of our BME students' projects that were presented at the Hajim School Design Day (pages 16-17).

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

## faculty awards

### BME faculty members inducted to AIMBE's College of Fellows



Professor Catherine K. Kuo



Professor Danielle Benoit



Professor Amy Lerner

Three biomedical engineering primary faculty members at the University of Rochester were inducted into the College of Fellows of the American Institute for Medical and Biological Engineering (AIMBE) – Danielle Benoit, Catherine Kuo and Amy Lerner. AIMBE's College of Fellows is comprised of the top two percent of medical and biological engineers. AIMBE Fellows are employed in academia, industry, clinical practice, and government. A total of 156 Fellows, chosen for outstanding contributions in research, practice, or education, were formally inducted at the AIMBE Annual Meeting at the National Academy of Sciences in Washington, D.C. in March 2019.

**Professor Danielle Benoit** was elected an AIMBE Fellow in recognition of her "outstanding contributions to the design of 'smart' materials to treat diseases, control cell behavior, and answer fundamental biological questions." A member of the UR BME faculty since 2010, Professor Benoit develops therapeutic biomaterials for tissue regeneration and targeted delivery of therapeutic drugs.

**Professor Catherine Kuo** was elected an AIMBE Fellow in recognition of her "innovative contributions to understanding mechanical regulation of embryonic development to inform tissue engineering and regenerative medicine strategies." Professor Kuo leads a multidisciplinary research team in developing novel strategies to regenerate adult tissues from stem cells inspired by embryonic development.

**Professor Amy Lerner** was elected an AIMBE Fellow in recognition of her "outstanding contributions to orthopaedic biomechanics, engineering design education, and diversity in engineering and academia." Professor Lerner's research has focused on gender and ethnic differences in anatomy, the role of the meniscus in pressure distributions, and the effects of obesity on risks for knee osteoarthritis.

*There are now 13 primary and secondary BME faculty members that are Fellows of AIMBE.*

*AIMBE Fellows among UR BME Primary Faculty: Hani Awad, Danielle Benoit, Laurel Carney, Diane Dalecki, Catherine Kuo, Amy Lerner, James McGrath, Rick Waugh.*

*AIMBE Fellows among UR BME Secondary Faculty: Denise Hocking, Duncan Moore, Kevin Parker, Edward Schwarz, J. H. David Wu*

**"Three new fellows in one year is fantastic," says Diane Dalecki, chair of the Department of Biomedical Engineering. "We are so proud of all of our recipients, for their innovative research, teaching excellence, and outstanding service to their field and to our University. I look forward to continued recognition of the achievements of our outstanding BME faculty."**



*UR BME AIMBE Fellows beside the bronze Albert Einstein Memorial Statue at the National Academy of Sciences. Pictured left to right: Danielle Benoit, Edward Schwarz, Amy Lerner, Catherine Kuo, Diane Dalecki, Rick Waugh.*



# faculty awards cont.

## Professor Jim McGrath wins Outstanding Faculty Award



Hajim Outstanding Faculty Award recipient Jim McGrath (middle) pictured with fellow University of Rochester BME faculty members at the 2019 graduation ceremony.

Congratulations to Professor James McGrath who received the 2019 Edmund A. Hajim Outstanding Faculty Award. Professor McGrath is recognized internationally as a leader in bio-nanotechnology. He leads a highly productive research laboratory dedicated to advancing novel technologies for fabricating nanomembranes for engineering applications in biosensing and separations processes. As founder and past-president of SiMPore, Professor McGrath has pioneered silicon-based nanomembrane and lab-on-a-chip technologies for biomedical engineering applications including hemodialysis, biosensing, and protein separations. His work is highly translational and has led to numerous issued patents for his advances in nanoscale membranes and associated technologies. Professor McGrath is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE) and is recognized widely for his scientific and engineering achievements. Professor McGrath is also an outstanding educator. He teaches the core undergraduate course in biomechanics, as well as advanced courses in microbiomechanics. He is an outstanding mentor for our undergraduate and graduate students, and a fantastic member of the BME faculty.

## Professors Mark Buckley and Laurel Carney receive Kearns Faculty Mentoring and Teaching Award for commitment to first-generation, minority students



The David T. Kearns Faculty Mentoring and Teaching awards "recognize outstanding faculty members who excel at mentoring and teaching low-income, first-generation, and/or underrepresented minority students who participate in Kearns programs," says Anthony Plonczynski-Figueroa, director of operations for the Kearns Center. "These faculty members have shown an especially strong commitment to these students."

Laurel Carney, the Marylou Ingram Professor in Biomedical Engineering was recognized for her mentorship of University undergraduates who conduct research each summer through the center's Xerox Engineering Research Fellows and the Ronald E. McNair program. Professor Carney was also among the first faculty members to mentor a student in the center's new Kearns Summer

Research Scholars Program, which was inaugurated this year to enhance the research experience of students working in labs independently of the center's formal programs. Benjamin Richardson '21, one of the inaugural Kearns Summer Research Scholars, says that Carney "exceeded every expectation I could have had for a faculty mentor. It is clear in everything she does that she is not only incredibly passionate about what she studies, but passionate about the success of her students."

Professor Mark Buckley was recognized for his outstanding work with the Kearns Center's pre-college programs: Upward Bound, Upward Bound Math/Science, and Talent Search. Professor Buckley began working with the Kearns Center in 2014. He was the first faculty member to host a high school "STEMtern", that is, an Upward Bound Math/Science student that complete a six-week mentored research project. Professor Buckley has mentored seven Upward Bound students in his biomechanics research laboratory, and he is also an active mentor with the McNair, REU, and Xerox programs for undergraduates.

## Professor Danielle Benoit receives Undergraduate Teaching & Mentorship Award

Professor Danielle Benoit was the recipient of the University of Rochester College Award for Undergraduate Teaching and Research Mentorship at the University of Rochester. The award is funded by chemistry alumnus Frederick Lewis '68 (PhD) and his wife, Susan Rice Lewis. It salutes tenured faculty members in Arts, Sciences & Engineering who teach large, introductory classes as well as advanced seminars and independent study projects, and who mentor research experiences, especially those that involve laboratory training in the sciences and engineering.

Professor Benoit, who joined UR BME in 2010, leads a laboratory dedicated to therapeutic biomaterials, and she is also an outstanding educator in both our BME undergraduate and graduate programs. Professor Benoit has taught courses including Advanced Biomaterials, Biomaterials, Controlled Release Systems, Research Methods, and Cell and Tissue Engineering.

Professor Benoit "embodies the spirit of this award through her dedication to undergraduate learning through classroom teaching, research experiences, and mentoring," says Diane Dalecki, chair of the Department of Biomedical Engineering. "The research training and mentoring that undergraduates receive from Professor Benoit primes them for continued success as graduate students and throughout their professional careers."

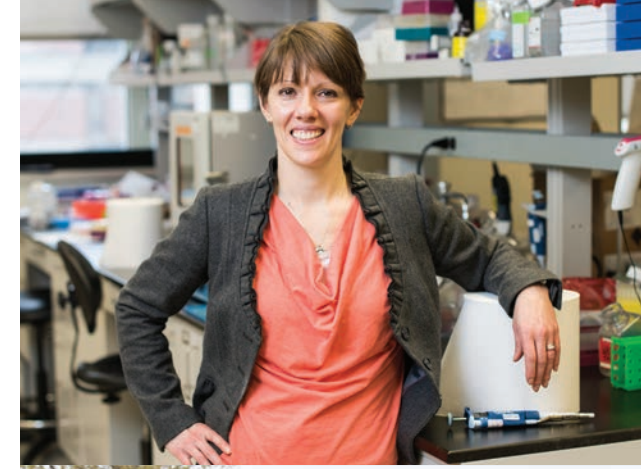
Over her career, Professor Benoit has provided research experiences for more than 80 undergraduates in her lab. Amanda Chen (UR BME '14) a graduate research fellow in biological engineering at MIT, says, "Danielle's lab was one of the biggest reasons why I chose to pursue a graduate degree. She gave me the opportunity to work on an independent project, publish a first-author paper, present at conferences, and more." Chen says she "often reflects on mentorship behaviors that I hope to build into my own management style – now as I work with undergraduate trainees (at MIT), but also in my future career. And I find myself often thinking back to my experiences in Danielle's lab."

## Professor Danielle Benoit appointed Director of Materials Science Program

Professor Danielle Benoit became the director of the Materials Science Program at the University of Rochester effective July 1, 2019. Professor Benoit's lab uses synthetic hydrogels for tissue regeneration and polymers to target drug delivery to specific tissues, minimizing harmful side effects in other parts of the body.

The Materials Science Program, established in 1966, offers master's and PhD degrees to students interested in research activities in which advanced materials are tailored for specific uses. About 50 faculty across several departments are affiliated with the program, which currently enrolls 20 PhD and 16 master's students.

"Danielle's strong background and outstanding research in materials science eminently qualify her for this position," says Wendi Heinzelman, Dean of the Hajim School of Engineering and Applied Sciences. "Her track record of collaborations with Medical Center, Hajim School, and Department of Chemistry faculty will enable her to pull together PIs from multiple disciplines to bring exciting new research focuses to the Materials Science Program and generate new collaborative, multidisciplinary projects," Heinzelman says.



*"I wouldn't be in medical school right now if it weren't for Danielle's mentorship," says Tim Felong, former Benoit Lab graduate student, now at the University at Buffalo's Jacobs School of Medicine and Biomedical Sciences. Felong says he especially appreciated the "culture" of the lab, which was more like a "family environment." "She takes the time to really get to know her students—their interests and hobbies. She hosts biannual parties, where you get to interact with her energy-packed, fun family. I think this openness and mutual appreciation for life inside and outside of work is really motivating for many people my age. I know it was for me."*





# faculty awards cont.

## Professor Amy Lerner among winners of 2018 Presidential Diversity Award

Amy Lerner, co-chair of the Commission on Women and Gender Equity in Academia (CWGEA) was among those honored with the 2018 Presidential Diversity Award. Former President Joel Seligman established the awards in 2009 to recognize faculty, staff, students, units, departments, or teams that “demonstrate a commitment to diversity and inclusion through recruitment and retention efforts, teaching, research, multicultural programming, cultural competency, community outreach activities, or other initiatives.”

As co-chair of the CWGEA, Professor Lerner helped to lead the commission, which is comprised of students, faculty and trainee volunteers, in evaluating campus policies and procedures. Utilizing a combination of scientific literature review and community input, CWGEA released their preliminary report with recommendations in May 2018. They continue to research, listen, and advocate for diversity and inclusion throughout the University community. When accepting the award, Professor Lerner said, “This award is a tremendous honor for us and is really rewarding to validate the very hard work that we have done so far. Perhaps just as important, I think it also goes a long way to validate the importance of the goals we are trying to achieve – real equity for all members of the University community. There are many wheels still turning to address some of the concerns we raised and we are grateful to see that many of our recommendations are being implemented. Thank you very much for the honor.”

# department news

## University of Rochester hosts Inaugural RCBU Biomedical Ultrasound Symposium Day



*Pictured above: Professor Amy Lerner (front right) pictured with the Commission on Women and Gender Equity in Academia (CWGEA)*

The Rochester Center for Biomedical Ultrasound (RCBU) at the University of Rochester unites scientists, engineers, physicians, and clinicians to advance the use of ultrasound in imaging and therapy. The inaugural RCBU Biomedical Ultrasound Symposium Day was held on November 6, 2018 and was a wonderful success! The RCBU Symposium Day is now an annual day devoted to sharing advances in biomedical ultrasound. The symposium is designed to showcase ultrasound research, foster collaborations, and provide a platform for trainees to present their research and connect with scientists, engineers, and clinicians from Rochester, other institutions, and industry partners.

Last year, the symposium featured the Distinguished Edwin L. Carstensen Lecture titled, “Your New Paradigm for Understanding and Applying Sonographic Principles,” delivered by Frederick W. Kremkau Ph.D., Director for Medical Ultrasound at Wake Forest University School of Medicine.



*Pictured above: (from left to right): Theresa Tuthill, Ph.D., Professor Stephen McAlevey, Professor Kevin J. Parker, Professor Diane Dalecki, Professor Frederick W. Kremkau*

Also featured was the Distinguished RCBU Alumni Lecture titled, “Ultrasound in Drug Development,” delivered by Theresa Tuthill Ph.D., Senior Director Clinical and Translational Imaging, Pfizer, Inc. The day’s events also included special lectures, a scientific poster session, lunch and networking. Support for the RCBU Biomedical Ultrasound Symposium Day is provided in part by the Edwin and Pam Carstensen Family Endowment.

## Beloved graduate program coordinator Donna Porcelli retires after 42 years at University, 17 in BME

Donna Porcelli has embarked on a well-earned retirement – despite the strong reservations of Professor James McGrath and no doubt many other faculty members in the Department of Biomedical Engineering. “It’s a bad decision,” McGrath deadpanned, drawing laughter from nearly 100 well-wishers who gathered recently to honor Porcelli, the department’s graduate program coordinator, at a farewell party in the Eisenberg Rotunda. “The reason that we can’t come to grips with this is we can’t imagine the department without you,” said McGrath. “We’ve never had a department without you.”

After joining the University in 1976, Porcelli spent 25 years in the Department of Chemical Engineering, handling nearly every aspect of the department’s budget and its undergraduate and graduate programs at one time. Along the way, she accumulated a wealth of knowledge about departmental procedures and university policies. So, she was a godsend when she joined the newly formed Department of Biomedical Engineering in 2001. At the time it had a department chair, four brand new junior faculty members, and one other staff person. “We were all newbies,” said Richard Waugh, the department’s founder and first chair. “Donna was the one who provided us with the guidance and the knowledge it took to really build this department into what it is today.”



*Pictured above: Graduate Coordinator Donna Porcelli (middle) surrounded by UR BME graduate students. Pictured at right (from left to right) Donna Porcelli, Hajim School Dean Wendi Heinzelman, BME Department Founding Chair Rick Waugh, BME Department Chair Diane Dalecki*

“Initially, Porcelli’s duties included administering the graduate program and faculty grants, assisting with the budget, and “pretty much administrating a new faculty search every year – so basically everything,” current chair Diane Dalecki recalled. “When I was a new assistant professor, Donna’s vast knowledge was simply invaluable to me in recruiting and advising graduate students, submitting grant proposals, and navigating ORPA (Office of Research and Project Administration), UCAR (University Committee on Animal Resources) and every other acronym that is new to a new faculty member” said Dalecki.

Porcelli, who received a University Witmer Award for Distinguished Service in 2017, made her biggest impact in recent years as the department’s graduate program coordinator. That included traveling each year to the BMES annual meeting as part of her efforts to recruit students; guiding master’s students, PhD candidates, and postdoctoral fellows every step of the way through their programs; scheduling graduate student committee meetings; and handling graduate student payroll.

Graduate student Christine Massie praised Porcelli for going “above and beyond” in helping her students. “We are constantly going into her office with either really big things, like preparing a (thesis) defense, or stressing over something little. Donna is always there for us.” Carla Boff, the department’s lead administrator, praised Porcelli for helping create a “warm, wonderful, professional” atmosphere in the department. “Every time I had a question, I would come to you and you would solve it,” said graduate student Raul Rodriguez. “And every time I went to a graduate student recruitment weekend, I would tell recruits that I attribute a lot of what I love about this graduate program to Donna.”

Porcelli acknowledged that retirement is a big step for her, but that she’s looking forward to some free time. “I have a lot of great memories,” she said. “These last 17 years in BME have been a wonderful experience.”



*“Donna was the one who provided us with the guidance and the knowledge it took to really build this department into what it is today.”  
-Founding Chair Rick Waugh*



BME students, Rebekah Abrams (right) and Taryn Milnes (left) demonstrate a prototype fume absorber they designed for a Unistel assembly line that employs workers with developmental disabilities.

## Students make assembly line more accessible for workers with disabilities

Hannah Goldring '19 decided to major in biomedical engineering at the University of Rochester because "it seemed like a way that I could make a direct impact on people." Goldring and three of her classmates — Rebekah Abrams '19, Taryn Milnes '19, and Olivia Uttamsingh '19 — have enjoyed the opportunity to do just that with their senior design project.

Working with Unistel Industries, a Rochester area company that provides employment opportunities for people with intellectual and developmental disabilities, the students analyzed an assembly line for producing radio dust covers for a defense contractor.

The process, which must meet exacting tolerances, includes fitting plastic knob covers and key rings onto pegs on a wood fixture, so they can be connected with cords that must then be clipped. This assemblage is then lifted off the fixture and hand carried to a toggle press where the clips are crimped. Any excess cord must then be burned off within two millimeters of the crimped clip with a burning blade. "Some parts of the process are really difficult, requiring a lot of motor skills and focus, and currently only one or two people are trained to do them," Goldring explained. And even then, errors creep in. For example, it is easy for the cords to tangle or the clips to shift out of place when the assemblage is picked up and moved to the toggle press. "We wanted to minimize the number of steps and modify the assembly line to be more accessible to more individuals — so Unistel can not only employ more people who wouldn't otherwise have the opportunity, but can also switch people around who are doing the tasks in case someone is out ill," Goldring says.

The students created a 3D-printed, adjustable platform that fits on the toggle press, where the knobs, key rings, cords, and clips can be connected and then crimped in one place, with no picking up and carrying in between. The students also came up with a more powerful fume absorber, with an extra filter, to better protect workers from the fumes created when the excess cord is burned off. They even devised a long-handled, tong-like device that workers can use to hold the excess cord up to the burning blade. This minimizes the chances of fingers getting burned, and it automatically burns enough of the excess cord to meet the two millimeter requirement.

Much of this was done on students' own initiative. "When we got there, they told us to do whatever we thought was needed," Abrams says. "It was definitely open-ended," Milnes adds.

"For a lot of senior design projects, the clients present a specific problem and ask you to solve it. We had the additional challenge

of finding the problems, and then solving them." Unistel has been "very encouraging," Milnes says. "They've been more than flexible; they've answered our questions." And they've given the students positive feedback. "It's been a great partnership."

### First all-female team to compete

The students presented their project at the CREATE (Cultivating Resources for Employment with Assistive Technology) competition sponsored by the New York State Industries for the Disabled. A total of 21 teams of college students entered, many of them graduate students who had worked on their projects full time for two years.

The Rochester team, called THOR Designs, placed seventh, and "received high praise from judges and participants for our design" Goldring says. THOR Designs was the first all-female team to compete.

The project was satisfying, the students say, because they felt they were making a real difference for workers with disabilities. They say the project was a good learning experience as well. "Working with a customer has given me experience that I could use for consulting, or other jobs where you have to work with other companies," says Goldring.

"What I've liked the most about the biomedical engineering program here is that it is very collaborative," Abrams adds. "I think engineers get a bad rep sometimes, for being a little antisocial, and not being able to work with people so well. This program really challenges us to make sure we defy that stereotype, and that we are able to work really well as a team."

## Ready to mentor 'students like myself'

Kharimat Alatise has known since middle school that she would attend college, but she never dreamed of the world awaiting after graduation. "My parents came to America from Nigeria when my mother was pregnant with me," the biomedical engineering major says. "No one in my family had ever gone to college, but my parents instilled in me that education would be my key to success."

Mother and father knew best. Alatise became a McNair Scholar through the David T. Kearns Center for Leadership and Diversity, learning professional development and graduate school exam preparation. Perhaps most important of all, the once introverted Hartford, Connecticut native became a confident woman with a limitless future. She joined the National Society of Black Engineers and Ma'Frisah West African dance group, became president of the Pi Beta Chapter of Delta Sigma Theta Sorority, and served as a chemistry teaching assistant.

"I don't know where I would be without the McNair program," she says. "I certainly wouldn't have gotten into research as an undergraduate. The Kearns Center has helped in ways I couldn't have imagined. The University is a place where you feel you can do anything."



Kharimat Alatise standing in Goergen Hall, home to the University of Rochester Department of Biomedical Engineering. Kharimat wants to be a professor and serve as a role model to first-generation and minority students.

This fall, Alatise will head to Clemson University to pursue her master's and doctorate degrees in biomedical engineering. "I didn't even know what BME was in high school," she says. "But I thought, 'I like math, I like science, I like medicine. How can I put these all together?' I did a Google search and 'biomedical engineering' came up." At Clemson, Alatise will be a "scientist in training," conducting research with the goal of becoming a professor.

"I want to mentor students like myself," she says. "I've had many great professors, but none that look like me. I want to be a role model to first-generation and minority students."

## THREE QUESTIONS

**Favorite class?**

1

"Fluid Dynamics, taught by David Foster. I really enjoyed this class because I could imagine how fluid dynamics is applied to my everyday life. I also liked Biomaterials, taught by Catherine Kuo, because of the mixture between biology, chemistry, and materials."

**Favorite tradition?**

2

"All of the special weekends—Fall-Fest, WinterFest, and SpringFest. I loved them because we received gifts. I have a Rochester pride sweater, and I've been waiting for it since my freshman year. It's not going anywhere."

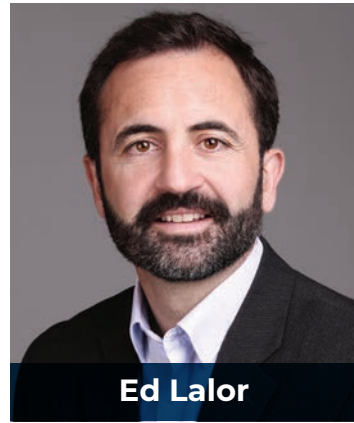
**Favorite spot on campus?**

3

"The Ruth Merrill Center in Wilson Commons. It's the perfect place to get in a quick nap or finish up some work in a comfortable environment."

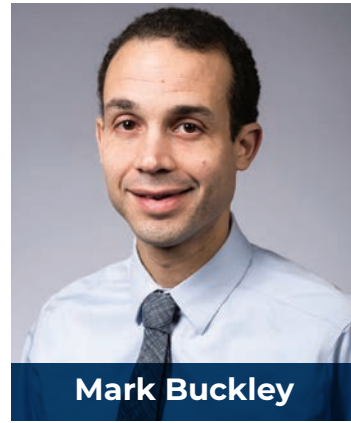


## new appointments



**Ed Lalor**

Ed Lalor was promoted to tenured Associate Professor of Biomedical Engineering, and of Neuroscience. Professor Lalor's research laboratory is dedicated to computational cognitive neurophysiology, and he is an instructor in courses in circuits and neuro-engineering.



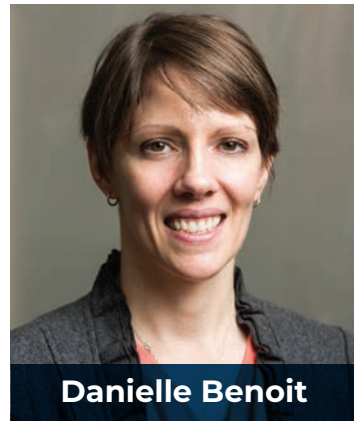
**Mark Buckley**

Mark Buckley was promoted to tenured Associate Professor of Biomedical Engineering. Professor Buckley's research laboratory is dedicated to soft tissue biomechanics, and he is an instructor of courses in the area of biomechanics and tissue viscoelasticity.



**Scott Seidman**

Scott Seidman was promoted to Full Professor (Instruction) of Biomedical Engineering. Professor Seidman is an expert in biomedical instrumentation, biosignals, and neuroscience, and he is an instructor for several core BME courses, including BME Senior Design.



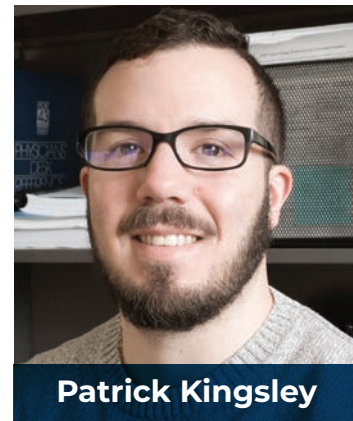
**Danielle Benoit**

Danielle Benoit was promoted to Full Professor of Biomedical Engineering. Professor Benoit is an expert in therapeutic biomaterials, and she is an instructor in courses in biomaterials, tissue engineering, and drug delivery. Professor Benoit was also appointed the Director of the Materials Science Program at the University of Rochester.



**Ania Dworzanski**

Ania Dworzanski joined the BME department as the new BME Graduate Coordinator. Ania is the administrative coordinator for the BME doctoral and master's programs. Ania replaces Donna Porcelli in this role after Donna's retirement in December 2018.



**Patrick Kingsley**

Patrick Kingsley joined the BME department as a Staff Account I and contributes to the financial management of the department as a member of the BME finance team.



*A view of Wilson Commons and Rush Rhees Library at the University of Rochester River Campus*

## student awards & honors

### Chantelle Lim wins Perdana Scholar Award



Congratulations to BME senior Chantelle Lim who received the Perdana Scholar Award. This honor is awarded to Malaysian students attending college in the United States. This year, Chantelle was one of three students awarded the Academic Excellence Award. Chantelle and the other award

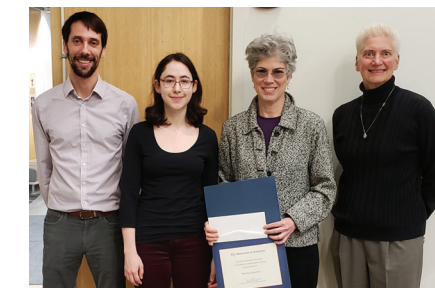
winners were invited to the Malaysian Embassy in Washington DC for the award ceremony.

### Ken Sims receives AADR Travel Grant Award



Congratulations to Ken Sims who received a 2019 American Association for Dental Research (AADR) Bloc Travel Grant Award. As a NIDCR-supported trainee, Ken received this support to present his scientific dental research at the IADR/AADR/CADR General Session and Exhibition. His abstract was titled, "Nanoparticle-Mediated Co-Delivery of Myricetin and Farnesol Synergistically Disrupts Oral Biofilms."

### Madeline Cappelloni wins Edward Peck Curtis Award



*Pictured (left to right): Professor Ross Maddox, Madeline Cappelloni, Dean Margaret*

Congratulations to Madeline Cappelloni, a graduate student in the lab of Professor Ross Maddox, who was awarded the 2019 Edward Peck Curtis Award for Excellence in Teaching by a Graduate Student. "In title, Maddy was a graduate TA for my fall 2018 course BME 230:

### Nancy Bansbach Earns 1st Team All-American Honors



A career year for senior Nancy Bansbach of the UR field hockey team culminated with one of the best possible outcomes, an All-American honor. Bansbach was selected to the Longstreth/NFHCA Division III All-American team. The Fayetteville, New York native becomes the 13th Rochester field hockey player to earn All-American honors, and is just the fourth in program history to earn 1st Team accolades.

Signals, Systems, and Imaging. In practice she was much more than that," said Professor Ross Maddox. "In addition to grading lab reports and holding office hours, she contributed a series of computer labs that greatly improved the course and decided of her own accord to hold additional weekly office hours to help people write lab reports." The award was personally presented by Margaret Kearney, Vice Provost and University Dean of Graduate



## student awards cont.

Studies. Established to encourage excellence in the work of graduate students who assist undergraduate instruction, the Edward Peck Curtis Award for Graduate Students is awarded to a small number of full-time graduate students with a role in undergraduate education.

### Maureen Newman receives 2019 Outstanding Dissertation Award



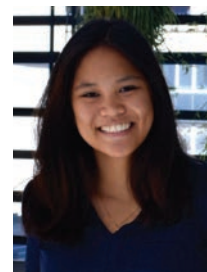
Maureen Newman was the recipient of the 2019 Outstanding Dissertation Award for the Division of Engineering and Applied Sciences in College of Arts, Sciences and Engineering. Maureen received the honor for her dissertation titled, "Bone-targeted Polymer Delivery of Osteoanabolics for Bone Regeneration." Maureen was also the recipient of the BME Outstanding Thesis Award.

### Ken Sims receives 2019 IADR Colgate Research in Prevention Travel Award



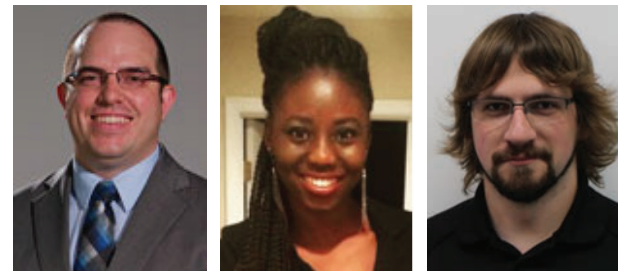
Ken Sims received a 2019 International Association for Dental Research (IADR) Colgate Research in Prevention Travel Award. This is an impressive accomplishment, as only six awards are given across five global IADR regions. The Colgate Research in Prevention award is supported by funding from the Colgate-Palmolive Company to encourage young investigators to undertake research in the prevention of oral diseases and to facilitate their presentation of this work to the international dental and oral health research community.

### Chantelle Lim awarded Charles L. Newton Prize



Congratulations to Chantelle Lim who was selected for the 2019 Charles L. Newton Prize. This honor is given to a student within the Hajim School of Engineering and Applied Sciences who shows special proficiency in some subject connected with engineering and who has conducted research, given a presentation, or published a paper.

### Benoit Lab graduate students receive honors from Society for Biomaterials



Three members of the Benoit Lab were recognized for their outstanding contributions to the 2019 Biomaterials Annual Meeting held in Seattle, WA. Graduate student Kenneth Sims (left) received a Student Travel Achievement Recognition (STAR) award that recognizes research excellence and helps

to develop future leaders within the Society for Biomaterials. Graduate students Marian Ackun-Farmmer (middle) and Clyde Overby (right) received Honorable Mentions.

### BME students among winners of Forbes Entrepreneurial Competition

Congratulations to the winners of this year's Charles and Janet Forbes Entrepreneurial Competition. Two BME students were among the winning teams. This competition is designed to encourage undergraduate engineering students to consider the commercial potential of their design projects.

Teammates on the EZ Water Team won first place and \$5,000 for their proposal that aims to provide cheap, reliable, quality drinking water to the doorsteps of millions of Pakistanis through a hyperlocal network of micropreneurs who leverage modern Hollow Fiber Membrane technology to filter, bottle, and distribute water from under one roof.

Nicholas Drogo '19 and his teammates on the WetWare Systems team won second place and \$2,500 for their project that targets athletic, civilian, and defense-related traumatic brain injuries with novel biotechnology to preemptively mitigate neurotrauma resulting from impact, acceleration, and explosive blast.



Picture: Nicholas Drogo (second from left) with teammates, judge Ann Forbes and Vice Provost for Entrepreneurship Duncan Moore.

### Hannah Goldring received Best Poster Award



Hannah Goldring received 2nd Place in the Best Poster Competition at the RCBU Biomedical Ultrasound Symposium Day. Hannah received the award for her scientific poster titled, "Mechanical Anisotropy in the Healthy and Pathological Achilles Tendon Assessed with Shear Wave Elastography." Hannah's research was supervised by Professor Mark Buckley and Professor Stephen McAlleavey.

## student fellowships

### BME PhD candidate Danielle Desa awarded 2019 Research Initiative Grant from the Breast Cancer Coalition of Rochester



Congratulations to Danielle Desa, a BME doctoral student in the lab of Professor Ed Brown, who received a 2019 Research Initiative Grant from the Breast Cancer Coalition of Rochester (BCCR). These grants are awarded to fund innovative new projects with the potential to yield significant medical breakthroughs in the cause and prevention of breast cancer. Danielle was awarded the \$25,000 Pre-and-Post-Doctoral Grant to support her proposal, "Understanding the Mechanisms Underlying a Novel Predictor of Metastasis." In this project, Danielle will investigate how light scattering from fibrillar collagen can help to predict metastasis in certain breast cancers.

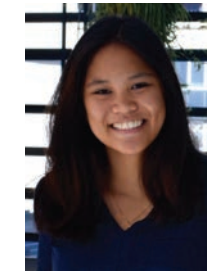
### Alec Salminen awarded Barnard Fellowship



Congratulations to BME PhD candidate Alec Salminen (co-advised by Professor Jim McGrath and Professor Thomas Gaboriski) who was awarded the Donald M. and Janet C. Barnard Fellowship from the College of Arts, Sciences and Engineering. These fellowships recognize outstanding achievement

by doctoral students in engineering and science, as evidenced through their coursework and their dissertation research work.

### Chantelle Lim receives Tau Beta Pi Graduate Fellowship



Chantelle Lim was the recipient of a prestigious Tau Beta Pi Graduate Fellowship. Chantelle will be attending Johns Hopkins University in the fall to pursue a PhD in Biomedical Engineering.

### Four Students Awarded Marylou Ingram Fellowships

Holly Eyrich, Shafaqat Rahman, Sheldon Cummings, and Alyson March were each awarded a Marylou Ingram Fellowship in Biomedical Engineering this year. These fellowships were established by Dr. Marylou Ingram, an alumna of the University of Rochester, to support and strengthen biomedical engineering at the University.

## HAJIM SCHOOL OF ENGINEERING & BME DEPARTMENT AWARDS

EDWARD PECK CURTIS AWARD FOR EXCELLENCE IN TEACHING BY A GRADUATE STUDENT  
Madeline Cappelloni - BME230

CHARLES L. NEWTON PRIZE  
Chantelle Lim

DONALD M. AND JANET C. BARNARD FELLOWSHIP  
Alec Salminen

MARYLOU INGRAM FELLOWSHIP  
Holly Eyrich  
Shafaqat Rahman  
Sheldon Cummings  
Alyson March

DONALD M. BARNARD PRIZE  
Robert Crews  
Anna Olsen

NATIONAL ACADEMY OF ENGINEERING GRAND CHALLENGES SCHOLARS PROGRAM  
Emma Luke

BME GRADUATE STUDENT TA AWARD  
Alexander Kotelsky

AS&E OUTSTANDING DISSERTATION AWARD  
Maureen Newman

OUTSTANDING BME THESIS AWARD  
Maureen Newman

BME FACULTY AWARD FOR UNDERGRADUATE SERVICE  
Chantelle Lim

BME FACULTY AWARD FOR EXCELLENCE IN UNDERGRADUATE RESEARCH  
Grace Weyand

BME FACULTY AWARD FOR TEACHING ASSISTANT  
Jamie King

BME OUTSTANDING SENIOR  
Amanda Hornick

BME OUTSTANDING JUNIOR  
Gabriel Sarch



# DESIGN DAY 2019



Each year, biomedical engineering students partner with companies and institutions to solve engineering problems through developing prototype medical devices and research instruments. We celebrate the culmination of our students' engineering education by hosting Design Day, where 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 healthcare 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, please contact Amy Lerner at amy.lerner@rochester.edu.

## Bladder Monitor

Ahmed Selmi, Camila Garcia Wright, Kharimat Lora Alatise, Alyssa Gardiner

Our goal is to design a wearable device that will measure the fullness of the bladder and notify a nurse or caretaker when the bladder is reaching full capacity. This will be done by measuring the bioimpedance of the bladder. The purpose of this device is to decrease the amount of falls that take place due to people attempting to use the bathroom unassisted.



## BIG Cardiovascular

Gavin Hambrose, Rebecca Macaluso, Ivy Mannoh

A way to stabilize the post-operative bisected sternum in delayed closure cases to allow safe and successful patient movement while supporting cardiac recovery during open chest management.



## Sinus Inspectors

Robert Crews, Amanda Hornick, Penelope Subervi, Alaa Bukhari, Lucy Franzen

A device that accurately indicates the probability that patients of different ages, sexes, and craniofacial anatomies have sinusitis in a way that is easily interpretable by primary care physicians or other medical professionals during an office visit. This device is a safer pre-screening method for sinusitis than CT scans, as it exposes patients to a negligible amount of ionizing radiation.



## Hemonamic

Huy Nguyen, Emily Grey, Elana Chazen

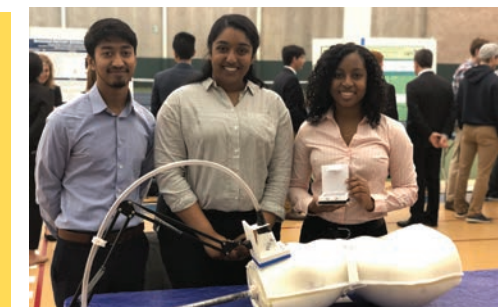
The hemonamic is a flow control device that provides dynamic regulation of blood flow to various parts of the body to reduce lower limb complications of patients on extracorporeal membrane oxygenation (ECMO).



## EchoMount Team

William MacCuaig, Shafieul Alam, Dominique James, Tiffany Nicholas

Our device is a mounting system that will hold an ultrasound transducer to monitor for blood clots after reconstructive surgery.



## Nerve Phantom

Maura McCartney, Jamie King, Frances McAfee, Nick Drogo, Richard Simcic

A nerve block is a procedure using imaging to locate problematic nerves and administer a block to treat the pain. The sympathetic stellate ganglion is difficult to image using ultrasound due to the similar density of the surrounding tissue and depth within the body. The proposed idea is to utilize the natural emitted signal from the stellate ganglion for more accurate needle placement. Current nerve phantoms do not have electrophysiological properties needed for this proposed idea. Therefore, we will develop an electrophysiologically accurate phantom to be used by medical residents in the hospital.



## Pitch Perfect Solutions

Abril Aguirre, Gabriel Guisado, Chantelle Lim, Nathaniel Silvia

Our team was tasked with designing a pre-sized implant that can be easily customized during surgery and a depth gauge that allows depth measurement from varying angles and provides better visualization of medialization depth through the laryngoplasty window in the thyroid cartilage. This new design will improve the precision of this surgery by minimizing surgical time, mitigating suboptimally-shaped implant, which will ultimately improve the patient's voice and surgical outcome.



## IASO Surgical Solutions

Ariana Cervantes, Devon Foggio, Alyssa Marzella

OMOS is a surgical table accessory utilized in anterior cervical spine surgeries. OMOS provides a surgeon sterile control of patient positioning throughout procedures allowing for increased visualization on x-ray images and decreased risk to the patient.





# funding news

For information on how to support the research of our BME faculty, please contact Derek Swanson at [derek.swanson@rochester.edu](mailto:derek.swanson@rochester.edu) or 585.273.1341



## Professor Ross Maddox

**Rapid acquisition of the frequency-specific auditory brainstem response through parallel stimulus presentation**

**Sponsor: National Institutes of Health (NIH)**

The frequency-specific auditory brainstem response (ABR) is a diagnostic tool that is used to test for hearing loss in infants and prescribe treatments such as behavioral intervention or hearing aids. This project aims to develop a new, rapid ABR exam, allowing more complete and accurate diagnoses.



## Professor Jim McGrath

**PFI-TT: Development of flow-through sensors for the detection of bladder cancer in urine samples**

**Sponsor: National Science Foundation (NSF)**

This project will advance the concept of the liquid biopsy by developing flow-through sensors that detect cancer biomarkers on extracellular vesicles (EVs) in urine. The sensor will be built on a highly permeable membrane, and EVs carrying the biomarkers will pass through the membrane where they will be captured and revealed through enzyme-based detection.



## Professor Michael Giacomelli

**Fluorescence microscopy for evaluation of Mohs surgical margins**

**Sponsor: National Institutes of Health (NIH)**

This proposal will develop advanced surgical imaging technologies for Mohs surgery, employing fluorescent imaging, rapid tissue labeling, and image processing technologies to enable real-time evaluation of pathology in skin tissue with an order of magnitude reduction in processing time as compared to frozen sections.



## Professor Laurel Carney

**Auditory processing of complex sounds**

**Sponsor: National Institutes of Health (NIH)**

This project tests the hypothesis that midbrain sensitivity to neural amplitude and frequency fluctuations in peripheral responses provides a robust representation of complex sounds, including speech.



## Professor Mark Buckley

**Recurring rupture and repair as a potential mechanism of osteoarthritis progression**

**Sponsor: UR PumpPrimer Award**

This project tests the hypothesis that progression of osteoarthritis is driven by the ability of cartilage cells to repeatedly tear and repair their membranes when exposed to periodic extreme mechanical forces.



## Professor Amy Lerner

**How partial meniscectomy effects contact mechanics and tissue response**

**Sponsor: National Institutes of Health (NIH) (subcontract)**

The goal of this project is to identify which knee forces are predictors for the development of osteoarthritis after partial meniscectomy procedure.



## Professor Richard Waugh (MPI: Minsoo Kim, Microbiology and Immunology)

**T cell migration and cardiovascular toxicity in immunotherapy**

**Sponsor: National Institutes of Health (NIH)**

This project will investigate the molecular and cellular mechanisms of chemokine-mediated migration of therapeutic CD8 T cells.



## Professor Jim McGrath

**Computational models of nanomembrane fouling**

**Sponsor: Center for Emerging and Innovative Sciences (CEIS) and Center of Excellence in Data Science (CoE)**

This project will examine the feasibility of using electrical resistance measurements in a microdevice to monitor the capture of exosomes in real time.



## Professor Whasil Lee

**Targeting mechanosensitive ion channels for ACE-injury associated osteoarthritis: Evaluation in a mouse model**

**Sponsor: UR Pilot Award, Center for Musculoskeletal Research (CMSR)**

The goal of this project is to measure the outcome of intra-articular injection of piezo inhibitors using osteoarthritis mouse model.



## Professor Jim McGrath

**SEA-PUR: A new platform for improved microplastic contamination surveillance**

**Sponsor: National Institutes of Health (NIH) with SIMPore (subcontract)**

This project will advance silicon microslit nanomembranes to enable the easy isolation and chemical identification of environmental microplastics.



## funding news cont.



**Professor Jim McGrath** (MPI Wyatt Tenhaeff, Chemical Engineering)

**MRI: Acquisition of a variable angle spectroscopic ellipsometer**

**Sponsor: National Science Foundation (NSF)**

This grant from the NSF Major Research Instrument Program will enable the acquisition of a variable angle spectroscopic ellipsometer.



**Professor Mark Buckley**

**Comparison of the effects of miPORT and traditional phacoemulsification on the viability and vulnerability of corneal endothelial cells**

**Sponsor: IanTech**

The objective of this study is to compare how traditional phacoemulsification and a novel cataract removal technique impact corneal endothelial cell viability and vulnerability to mechanical forces.



**Professor Jim McGrath**

**Flow-through biosensor components for vesicle detection platform**

**Sponsor: Jeff Lawrence Manufacturing Innovation Grant**

This project will develop proof-of-concept demonstration that novel, ultrathin, silicon-based filter membranes can serve as efficient means for isolating and then analyzing exosomes.



**Professor Amy Lerner**

**Refining and validating a model to characterize shape changes due to LIRIC writing on cornea**

**Sponsor: Center for Emerging and Innovative Sciences (CEIS) and Clerio Vision**

This project will model and validate the effects of Laser Induced Refractive Index Change (LIRIC) on corneal shape and resulting optical corrections.



**Professor Jim McGrath**

**In vitro methods for the study of transport of environmental microplastics through intestinal barriers**

**Sponsor: UR Pilot Award, Environmental Medicine**

Microplastic pollutants are now routinely found in sea and fresh water, food and beverages, as well as intestinal tracts of fish and mammals. This proposal will apply UR's silicon membrane technology to isolate and precisely size microplastics from environmental samples, and a confocal Raman microscope to determine the types of microplastics.



*Pictured (left to right)  
Top: Regine Choe, Ross Maddox  
Middle: Jim McGrath, Denise Hocking  
Bottom: Lisa DeLouise, Andrew Berger*

## Several BME professors receive University Research Awards

BME primary faculty Regine Choe, Ross Maddox, and Jim McGrath, as well as BME graduate faculty members Denise Hocking (Pharmacology & Physiology), Andrew Berger (Optics) and Lisa DeLouise (Dermatology) were recipients of this year's **University Research Awards**. These awards provide "seed" grants for promising, high-risk projects. The fund for the University Research Awards increased from \$500,000 annually to \$1 million this year. Half of the funding comes from the President's Fund, with the rest being matched by the various schools whose faculty members are recipients. Applications are sought from faculty across the University, and funding is awarded to projects that propose new research with a high probability of being leveraged by future external funding. A review committee of faculty from across the University provides peer review of the applications.

### 2019 BME Recipients of University Research Awards

**Regine Choe** and **Ross Maddox**, for Non-invasive Cerebral Blood Flow and Evoked Potential Monitoring in Adults Undergoing Extracorporeal Membrane Oxygenation. Other collaborators: Imad Khan (Neurology, Neurosurgery, and Medicine) and Sunil Prasad (Surgery and Chief of Cardiac Surgery)

*This study will combine diffuse correlation spectroscopy with sensory-evoked potentials into one device that can monitor the brain in patients with heart or lung failure who receive extracorporeal membrane oxygenation (ECMO), which carries a significant risk of brain injury.*

**Denise C. Hocking**, for Bacterial Pathogens, Fibronectin Mimicry and Intestinal Permeability. Other collaborators: Michelle Dziejman (Microbiology and Immunology)

*This study will determine whether fibronectin (FN), a principal component of the extracellular matrix (ECM) of the intestinal wall, contributes to barrier function and explore whether pathogenic bacteria impair intestinal permeability by disrupting ECM FN dynamics.*

**James McGrath, Andrew Berger, and Lisa DeLouise**, for Confocal Raman Microscopy for the Identification of Microplastics in Cells and Tissue. Other collaborators: Wayne Knox (Optics), Jonathan Flax (Urology), and Mahlon Johnson (Pathology and Laboratory Medicine)

*Microplastic (MP) pollutants are now routinely found in sea and fresh water, food and beverages. The team will develop a confocal Raman Microscope capable of examining the ability of MPs to pass through human tissue barriers and accumulate in organs.*



# alumni corner



*"I love what I do because I educate and work with surgeons across various specialties to help restore their patients' quality of life."*

## Stephanie Bristol Ryzman

**Hometown:** Manlius, NY

**Current location:** Portsmouth, NH

**Degree:** University of Rochester, BS, BME 2004

**Current position & company:** AxoGen, Area Sales Manager

**What you enjoy most about your career?** I have thoroughly enjoyed working in the medical device field because it perfectly blends my engineering background with medicine. I currently work for a company that focuses on technologies for peripheral nerve regeneration and repair. I love what I do because I educate and work with surgeons across various specialties to help restore their patients' quality of life.

**Why did you pick University of Rochester?** I was not only impressed with the BME program and everything it had to offer in the classroom, but also the student community I connected with there. I thoroughly enjoyed playing on the Varsity Lacrosse and Volleyball teams, which was possible through the

support of the coaching staff and professors understanding my passion for both academics and athletics.

**Favorite memory of UR:** I will never forget when our lacrosse team won the 2002 NYS championship!

**Advice for current/future students:** Do your best to network with anyone and everyone, utilize your professors and get involved with any internship opportunities. I've learned the more you put yourself out there to learn and make connections, the better prepared you will be after college. I would also recommend studying abroad while you're there since it's a life-changing experience. You should be excited knowing that your BME degree will provide you the opportunity to take your career in various directions.

**Hobbies:** Traveling, photography, flag football, attending sporting events & live concerts

**Family:** My husband, Rich, and our spunky Maine Coon cat, Jack

*"The aspect of my career that I enjoy the most are these patients stories, which are sometimes heartbreaking but always inspirational, and instill in me a strong sense of purpose and compassion that keep me motivated and engaged."*

## Kai-Roy Wang



**Hometown:** Lexington, MA

**Current location:** Jersey City, NJ

**Degrees:** University of Rochester, BS, BME 2010  
Columbia University, MS BME 2011

**Current position & company:** Senior R&D Engineer, MTF Biologics

**What you enjoy most about your career.** My career thus far has been built around product development in the regenerative medicine space and has provided me with the unique opportunity to collaborate closely cross-functionally within my company as well as externally with clinicians to develop products that help improve patients lives. The aspect of my career that I enjoy the most are these patient stories, which are sometimes heartbreaking but always inspirational, and instill in me a strong sense of purpose and compassion that keep me motivated and engaged.

**Why did you pick University of Rochester?** I had a great visit to the U of R during my campus tour and really felt at home. The flexibility in the curriculum and strength in biomedical sciences pretty much sealed the deal (along with the generous financial aid!).

**Favorite memory of UR:** Most of my favorite memories of UR are from the first week of Freshman year when I met most of my closest friends, many of whom I still keep in touch with. These were the kids that I fell asleep in class next to, spent many all-nighters studying with and eventually graduated beside. Thinking back, it's fun to remember how we all met before embarking on this great journey together.

**Why Biomedical Engineering?** I started off as a Biology major on the pre-med track because I had wanted to work in emergency medicine and to have a direct impact on people's lives. However, I switched into Biomedical Engineering because I quickly realized that I wasn't built for medical school and that BME would provide me with the ability to potentially make a difference in people's lives in a different way. The opportunity to work on cutting edge devices, biologics, tools and medicine at the intersection of biology and engineering

was just too exciting of an opportunity to pass up.

**Advice for current/future students:** Don't worry too much about what you're going to be doing or where you will be too far into the future. Things will (almost) certainly end up differently than you initially imagined. Plan for the short term and stay present – the most important thing that you can do today is to absorb as much as you can.

**Hobbies:** Music, movies, basketball, cooking



## Tristan Barrueco

**Hometown:** Basking Ridge, NJ

**Degrees:** University of Rochester, BS, BME 2009; SUNY College of Optometry, OD, 2018; Southern California College of Optometry/Salt Lake City VA, Residency in Primary Eye Care/Cornea & Contact Lens, 2019

**Current position & company:** Optometrist at a small ophthalmology group practice

**What you enjoy most about your career:** I've been able to travel to some countries

that I would have never thought I would go to to help volunteer including being selected as one of a couple dozen optometry students from around the United States to go to Dar es Salaam, Tanzania to give free eye exams. I enjoy that I am constantly challenged on a daily basis and that no two days are alike.

**Why did you pick University of Rochester?** I picked it because it is a "big" small school. It has the resources of a large university while keeping small, personal classes. I didn't want the experience of just being another number. Having strong engineering programs while being able to maintain a liberal arts education was also important.

**Why Biomedical Engineering?** I've always been a very curious and analytical person and have always been fascinated by science. I knew that I wanted to go into a STEM field and I started to hear a lot about biomedical engineering in the news. It seemed to be a field that was rapidly growing and doing a lot of interesting things. I really liked how it combined elements of biology, math, physics, and problem solving into one.

**Advice for current/future students:** Do not try to passively learn something. You need to actively engage in your learning. It wasn't until optometry school that I mastered this, but I carried a dry erase board with me everywhere and used it to reinforce my ideas. If I needed to reinforce it more, I could just erase and do it over again! It made my learning exponentially more effective and stick!

## Onika Noel

**Degrees:** University of Rochester, BS, BME 2007; University of California Los Angeles (UCLA), PhD, Molecular Biology 2014; University of California Los Angeles (UCLA), MD, 2016

**Current position & company:** Resident Physician at University of California, Davis, Department of Urology

**What you enjoy most about your career.** Urologic surgery is very much like engineering for the urinary tract! I love operating with all of the gadgets and tools while problem solving how to approach each condition – whether it's getting past a blockage so

someone can empty their bladder at 1am or blasting away kidney stones!

**Favorite memory of UR:** I was a member of the dance group, "Indulgence" for my first two years at U of R. We danced to jazz, pop and hip hop and performed at Meliora! It was so awesome to experience this with all of the other multicultural groups on campus!

**Why Biomedical Engineering?** BME offers an interdisciplinary approach to advance medicine and science. I loved the ability to be creative while being on the forefront of medicine. I had not yet decided on a career in medicine and I knew this major would keep my interest as well as the option for medical school open.

**Advice for current/future students:** College is a unique time where you have the decision-making capacity of an adult but few of the real responsibilities (i.e. bills bills bills!!). You should focus less on the destination, enjoy YOUR path and experience as much as you can. You will end up where you meant to be if you keep a good balance between following your passions and using common sense.

**Words to live by/favorite quote:** "What are we going to do tonight Brain? Same thing we do every night Pinky! Try to take over the world!"

-Brain of House Pinky & the Brain

"The mediocre teacher tells; the good teacher explains; the superior teacher demonstrates; the great teacher inspires." -William Arthur Ward

**Where would you like to be in 5-10 years?** CEO and creative director of my life! I would like to be practicing medicine in a setting that allows me to work in underserved populations in the United States, alongside medical students and residents. I would also like to establish a global company serving underresourced populations in an innovative manner engineered to deliver quality healthcare.

**Hobbies:** Traveling, tomfoolery, photography, writing, and dancing





# alumni corner cont.



## Matthew Andisik

**Hometown:** New Hartford, NY

**Current location:** Yorktown Heights, NY

**Degree:** University of Rochester, BS, BME 2002

**Current position & company:** Associate Director of the Clinical Bioanalysis group at Regeneron Pharmaceuticals, Inc.

**What you enjoy most about your career:** My team supports every drug candidate in Regeneron's clinical development pipeline, providing key drug concentration, biomark-

and immunogenicity data. To see a drug go from inception to approval, and know that we played a significant role in the process is quite rewarding. The positive impact that we can have on a patient's quality of life is the ultimate motivating factor, and Regeneron does a great job of maintaining a patient-focused company vision.

**Favorite memory of UR:** First and foremost, UofR is where I met my wife. We've known each other since our sophomore year and have been happily married for 11 years. Additionally, joining Sigma Chi fraternity created an environment that allowed me to balance the education and social aspects of college, and afforded me the opportunity to have an impact on our community and build several life-long friendships.

**Why Biomedical Engineering?** I have always been math and science focused in terms of what interested me academically. Being able to marry those two in a field that I felt was on the cutting edge and going to have a significant impact both scientifically and from a technology standpoint seemed like a perfect fit.

**Advice for current/future students:** The path to success may meander from time to time, but as long as you stay focused on your end goal and persevere you'll reach the finish line. Take advantage of the opportunities in front of you, but don't hesitate to create your own opportunities as well. Your degree will help provide you with the technical skills you need, but developing complementary soft skills will play a significant role in your futures successes.

**Favorite quote:** "Do not follow where the path may lead, go instead where there is no path and leave a trail." - Ralph Waldo Emerson

**Family:** My wife Elizabeth (UofR 2002), three-year-old daughter Victoria, and our Labrador retriever Lucy

## From slug slime to medical adhesive – Ben Freedman '11 looks to nature to inspire engineering solutions



*"The future of medicine is all about developing materials that respond to the way tissues heal. It is rewarding to work on technology that will promote healing and drug delivery and make a difference in people's lives."*

It is not uncommon for scientists like Ben Freedman '11 to look to nature for engineering inspiration – including the development of a super tough surgical gel that can strongly adhere to wet and dynamic surfaces inside the body. Think about a beating heart, entangled tissues, collapsed lungs, damaged cartilage, and broken bones.

"Our hydrogel technology is based on the incredibly stretchy mucous that Dusky Arion slugs emit when they sense danger," says Freeman, a post-doctoral fellow at the Wyss Institute for Biologically Inspired Engineering at Harvard University. "Our tough gel can stretch 20 times its length without breaking, which is more than what the most resilient rubber band can do."

According to Freedman, many of the medical grade adhesives available now just aren't tough or sticky enough, and they are rigid. They behave, as he says, like super glue. Because of this, they can kill cells. Fortunately, his research team's tough gel addresses all of this and more. Health care practitioners can mold it into

any shape, insert it into syringes, and then apply or inject it into a specific area. Although not commercially available yet, this tough gel is far along in the clinical study stage.

Freedman enjoys many aspects of his work, from making gels and looking at tissue cultures to analyzing data and planning studies. He also appreciates interacting with extremely smart, motivated people with similar goals. Working with early career scientists and sparking their interest in innovative technologies is also a plus.

"It all comes back to my undergraduate education," he adds, noting how he spent several summers working in the National Institutes of Health research labs. This was an opportunity presented to him through the biomedical engineering faculty, with whom he is still close. "If I hadn't had access to great faculty and gone to Rochester, I wouldn't be where I am today."



*Pictured at left: UR BME '11 alum Ben Freedman, now a post-doc at Harvard University, stretches his research team's newly developed surgical gel. This tough gel can stretch 20 times its length without breaking, which is more than what the most resilient rubber band can do.*

## Stay engaged with our BME Department

Our BME students' educational experiences and our departmental research and innovation are uniquely enhanced through participation of alumni, industry, and community partners. Please consider engaging with UR BME through one of the avenues listed below and contact Department Chair Diane Dalecki ([dalecki@bme.rochester.edu](mailto:dalecki@bme.rochester.edu)), if you're interested in exploring opportunities to engage with UR BME!

**Student Project Customer** Could your company, laboratory, or clinical practice use a fresh perspective on an engineering problem? Each year, students in our undergraduate Senior Design experience and master's students in our Medical Device Design program partner with companies, researchers, and clinicians to solve problems through developing medical devices and research instruments. Consider being a customer for a student design project.

**Research Collaborator** Collaborate with our world-class faculty in state-of-the-art laboratories to advance research in biomedical engineering. Whether you are in industry, academia, or a healthcare profession, our faculty and students welcome new collaborative opportunities to advance novel research initiatives.

**Mentor a Student as a "Real Reader"** BME alumni can mentor current engineering students as they develop resumes and cover letters, practice spoken communication skills, and reflect on their career goals. Volunteering as a "Real Reader" for a required course called Communicating Your Professional Identity is a meaningful way to give back without a large time commitment.

**Industry Partner** Consider a partnership between your company and our BME department. Industry partnerships can include joint research initiatives, design projects, student internships, and other opportunities of mutual benefit.

**Teacher** Contribute your expertise to our BME courses and educational programs. Your knowledge and perspective can offer new dimensions to our courses, student experiences, projects, and academic programs.

**Career Advisor** Interested in sharing your experience with the next generation of biomedical engineers? Help BME students navigate the next steps of their careers through one-on-one conversations or participating in a BME Career Conversations session.

**Donor** Support our BME students, research, educational programs through philanthropy.

**Visitor** Come back to Rochester and visit the BME department and our students! Let us know when you will be in Rochester and we will work with you to schedule opportunities for you to interact with students, faculty, and staff.

# UR BME 20 years

*The Department of Biomedical Engineering at the University of Rochester was formally established in July 2000. Since its inception, UR BME has become a premier biomedical engineering department, internationally-recognized for excellence in research, education, and innovation. At our 20-year point, we celebrate the talents of our undergraduate and graduate students, the growth and accomplishments of our faculty, the dedication of our administrative and technical support teams, and the vibrant achievements of our diverse BME alumni! Throughout the next year, watch for events celebrating our 20 Years of BME!*





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. Its mission encompasses research, education and innovation.

research

education

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 RCBU Annual Report.



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)



## 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 our Graduate Program Coordinator at 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 2018

Emmanuel Diabor  
YeJin Jeong  
Logan Knoerzer

### December 2018

Madeline Cappelloni  
Seana Catherman  
John Cognetti  
Irfaan Dar  
Ma Rie Kim  
Jiewen Li  
Joseph Majeski  
Christine Massie  
Paul Mitchell  
Lindsay Piraino

Jose Suarez Loor  
Shyanthony Synigal

### May 2019

Kayli Hill

### August 2019

Antonion Korcari  
Yingxuan Wang  
Jon Strauss

### Center for Medical Technology and Innovation (CMTI) MS

#### August 2018

Rebecca Amorese  
Gregory Dadourian  
Alyssa Lopez  
Connor McBride  
James Melton  
Meghann Meyer  
Emily Newman  
Eric Ravinal  
Joshua Schum-Houck  
Justin Schumacher  
Amanda Smith  
Raiem Smith  
Evan Sosnow  
Vladimir Tokarchuk

## PhD

### August 2018

Greg Madejski

"Silicon-Based Nanomembrane Uses in Biosensing"

Margaret Thomas-Freeberg

"Nanoparticle Mediated Delivery of siRNA Targeting of Serpine1 for Enhanced Flexor Tendon Repair"

Jomy Varghese

"Salivary Gland Radiation Protection"

Xixi Wang

"Application of Pattern Analysis in Understanding Brain Aging-associated Symptoms and Alzheimer's Disease using Functional MRI"

### October 2018

Maureen Newman

"Bone-targeted Polymer Delivery of Osteoanabolics for Bone Regeneration"

### December 2018

Tejas Khire

"Silicon Nanomembranes for Advanced Microvascular Mimetics"

### May 2019

Ninoshka Fernandes

"CD4+ Effector T Cell Interactions with the Extracellular Matrix at Sites of Inflammation"

Ryan Trombetta

"3D-Printed Bone Graft Substitutes to Eradicate Implant Associated Osteomyelitis"

### August 2019

Anas Abidin

"Imaging Biomarkers for Neurologic Disease: A Computational Framework for Functional MRI Analysis"



Doctoral student Tom Stoll adjusts a loudspeaker using a custom laser alignment device that he designed and 3D printed. The loudspeaker is one of 53 which make up an array in the lab of Assistant Professor Ross Maddox. Work in the lab is aimed at understanding how humans are able to understand speech in noisy environments as well as developing tools to diagnose hearing issues. Once complete, the loudspeaker array will allow sounds to be presented from many locations at once, which paired with a virtual reality headset will re-create highly realistic audio-visual scenes in the lab.

## CONNECT WITH UR BME



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Rochester, NY 14627

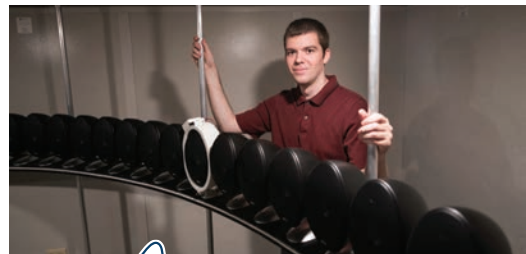
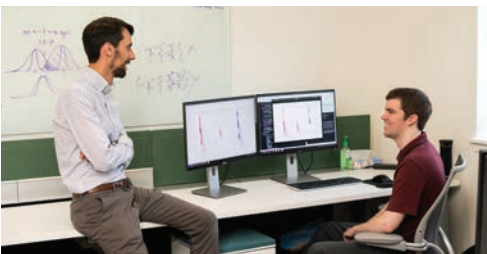


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[WWW.FACEBOOK.COM/UOFRBME](http://WWW.FACEBOOK.COM/UOFRBME)



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