Joint Department of

BIOMEDICAL ENGINEERING

THE UNIVERSITY *of* NORTH CAROLINA *at* CHAPEL HILL

NC STATE UNIVERSITY

FALL 2016 / **WINTER** 2017

IN THIS ISSUE

Nancy Allbritton

LETTER FROM THE CHAIR

DEAR BME ALUMNI AND FRIENDS:

In true collaborative UNC/NC State BME fashion, this spring and summer a group of faculty members, staff, students, alumni and communication professionals from both campuses closely examined the Joint Department's history, identity, strengths and challenges. The goal? To develop a Strategic Communication Plan that will present a unified and compelling picture to our many stakeholders, while emphasizing what makes this department unique and important.

The efforts of the Brand Identity and Strategic Communication Committee were guided by Ellen Bradley, a communication consultant with extensive experience in higher education. As part of the five-month process, the committee collected input from alumni, faculty members, staff, students and industry leaders through online surveys and focus groups. The committee's work culminated on September 30 with a presentation to faculty members, staff and students about the reinvigorated BME brand — including key messages, target audiences and communication channels — as well as a new visual identity that has been preliminarily approved by both universities.

Our new communication plan sets forth these goals for the Department's messaging:

- Explain what it means to be a truly joint department with the resources of a world-class engineering school, world-class medical school and several highly ranked professional schools
- Provide concise, compelling examples of innovative faculty research with an emphasis on promising outcomes for patients
- Illustrate the opportunities for student entrepreneurship and real-world experience offered through our curriculum
- Describe the unique advantages of the Department's connections with industry leaders in Research Triangle Park

In many ways, higher education is still getting used to the idea and importance of brand identity. But it's especially important for a joint department like ours — with so many unique benefits for students and faculty — to be able to differentiate ourselves from other BME departments around the country and to successfully compete for resources from industry and other stakeholders. For more information about the new BME Strategic Communication Plan and visual identity, visit **www.bme.unc.edu**.

As we move forward with our plans to better communicate the UNC/NC State BME brand, I am confident that the Department will attract increased private investment from individuals, corporations and foundations to advance our goal of becoming the nation's leading public biomedical engineering program.

I hope you will join me in making a year-end gift to the BME foundation accounts at either the University of North Carolina at Chapel Hill or NC State University. Thank you for your continued support of the Department's commitment to bridging engineering and medicine to improve lives.

Sincerely,

Nancy Allbritton MD, PhD

Nancy Allbritton, M.D., Ph.D.
Kenan Professor & Chair, UNC/NC State Joint Department of Biomedical Engineering
nlallbri@ncsu.edu | nlallbri@unc.edu

PHILLIPS HALL RENOVATION

BY WILLA MA

IN 2014, the first steps were made to build a new lab space at UNC-Chapel Hill specifically designed for BME students. Now, thanks to funding from the Chancellor's Office and the College of Arts and Sciences, the ground floor of Phillips Hall has been transformed into a functional and innovative space for the BME faculty and students.

BME professor Dr. Devin Hubbard has played a key role in the planning and design of the new project. When coming up with the initial proposal, Hubbard and other faculty members envisioned a flexible teaching space that could accommodate the construction courses that involve engineering design, electronics and instrumentation, while also serving as an instructional space.

The lab is divided into two main rooms: 19A and 19B. In both rooms, all the walls are writable and there are numerous projectors in each room that allow professors and students to wirelessly project their content simultaneously.

"[19B is] the electronics and instrumentation type side, and to some degree a fabrication space," Hubbard said. "19A is a flexible teaching space where there is no front to the classroom. The tables can be rearranged in whatever direction you want, and it is really meant more for the physiology and wet lab type courses that we have." The lab is designed to be easily reconfigured and adaptable to many teaching styles.

Keeping in mind that the BME Department is a joint program, the entire lab has incorporated teleconferencing technology to communicate with counterparts at NC State with ease.

"We wanted to build in collaboration into the space, so both rooms have state-of-the-art audio-visual equipment," Hubbard said.

In addition, the ground floor of Phillips Hall also features two Problem-based Learning labs (PBLs). The PBLs are designed like a conference room, but all the walls are writable, and a projector gives students the ability to teleconference with others.

"We were inspired by Georgia Tech and borrowed that idea," Hubbard said. "Georgia Tech has a pretty cool

Problem-based Learning program, and their first-year students spend a lot of time solving problems and learning to think through problems like an engineer."

The lab space has been beneficial to the students already, and Hubbard sees the technological benefits especially for the seniors in his class. Hubbard teaches a senior capstone design course that is two semesters. In this course, students shadow clinicians and identify an unmet clinical need based on their observations. In 2014 and 2015, joint teams with members from both UNC-Chapel Hill and NC State were formed. Based on the success of previous years, this year Hubbard hopes to put together three or four joint teams. The Phillips lab space's design and technology greatly benefit the students working on joint teams. The teleconferencing features allow for communication and cooperation without the need for traveling between campuses.

"We wanted to build in collaboration into the space"

— Professor Devin Hubbard

Unlike many other departments, the BME Department's new lab is a space specifically dedicated to the students, who have 24/7 access with a keycard.

"A lot of learning in our BME major happens outside of the classroom because you need practice with electronics, you need time to work on your designs, you have to practice with the 3D printer," Hubbard said.

The Phillips Hall BME space is already in use and is nearing completion. "The unique marriage of design space with teaching is one of the most interesting and unique features of the space," Hubbard said. "It's one of the most technologically advanced teaching spaces on all of UNC's campus." •

Dr. Devin Hubbard teaches in the new Phillips Hall classroom.

BME DEVELOPMENT ADVISORY BOARD FORMED

WE ARE EXCITED TO ANNOUNCE that the UNC/NC State Joint Department of Biomedical Engineering Development Advisory Board was formed on October 27, composed of alumni and other friends of the Department. The BME Board's goals are twofold. First, the Board has a "friendraising" goal of strengthening key relationships with alumni, citizens, businesses and other key stakeholders by sharing the Department's mission and vision for the future. Second, the Board works with our donors, friends and other supporters to increase needed private financial support for student scholarships, professorships and programs that are not fully state-supported. For more information about the BME Development Advisory Board, please contact Kyle Gray at **919.923.4908**, **khgray@ncsu.edu** or **kyle_gray@med.unc.edu**.

ALEXANDER B. EARLE, M.S.
NC State BME B.S.
Class of 2004 and
MBAE Class of 2008
Technical Lead, Industrialization
bioMérieux, Inc

JAMESON K. HOLDEN, PH.D.
UNC BME B.S.
Class of 2006
UNC/NC State BME
Ph.D. Class of 2013
Chief Technology Officer
Cortical Metrics

SETH D. GOLDSTEIN, M.D.
NC State BME B.S.
Class of 2003
Surgeon
Johns Hopkins Hospital

RACHEL B. HUNT, M.B.A.
NC State BME B.S.
Class of 2010
Senior Project Engineer
Teleflex

JENNA M. KILGORE
UNC BME B.S.
Class of 2015
Manufacturing Engineer
Teleflex Medical

CHRISTINE B. ROEDLICH, PH.D.
NC State BAE B.S.
Class of 1994
President and Head Trainer
The Equestrian Center at Boulder Spring

KATHRYN L. LOFTIS, PH.D.
NC State BME B.S.
Class of 2007
Research Analyst Contractor
Altus Engineering and U.S. Army Research Lab

BLAIR ROSZELL, PH.D.
UNC BME B.S.
Class of 2004
BPT Technology Manager
GSK GMS Biopharmaceuticals

HARRIS L. MCMURRY, M.S.
UNC BME M.S.
Class of 1984 and BMME Ph.D. Candidate 1989
Retired as Director of Oncology for **Siemens Healthcare** after 21-year career in 2012

VINAY TANNAN, PH.D.
UNC BME B.S.
Class of 2003, and M.S. and Ph.D. Class of 2007
Director of Licensing, Center for Technology Innovation and Commercialization
Wake Forest Innovations

KAREN T. RANDALL, PH.D.
UNC BME M.S. and Ph.D. Class of 1987
Owner
Randall Consulting

SUJA THOMAS, PH.D.
UNC BME Ph.D.
Class of 2010
Data Scientist
Pendo

SAGAR RATHIE, M.B.A.
UNC BME B.S.
Class of 2008
Director, Finance and Investor Relations
Crescent Communities

DANIEL J. WASSER, PH.D.
UNC BME Ph.D.
Class of 1990
Lead of Process Modeling and Data Analytics, Global Manufacturing & Supply Information Technology
Bristol-Myers Squibb

ALUMNI PROFILES

WHERE ARE THEY NOW?

AZIZ BOXWALA

M.D., Ph.D., FACMI, UNC BME Class of 1997

Dr. Aziz Boxwala

DR. AZIZ BOXWALA is currently the CEO of mWorks Health Inc., a company developing solutions for care management. Boxwala has many fond memories of attending the University of North Carolina at Chapel Hill from 1991 to 1996, graduating with an M.S. and Ph.D. in Biomedical Engineering. "Although I now live in San Diego," Boxwala says, "I am happy to advise UNC/NC State BME students about health informatics careers and perhaps connect them with internship opportunities."

Throughout his career, Boxwala has blended his skills and experiences from the health care IT industry with his faculty and administrative experience in informatics programs at Harvard Medical School and the University of California, San Diego.

At Harvard Medical School, he was an assistant professor with an appointment in the Division of Health Sciences and Technology, which is a joint program with the Massachusetts Institute of Technology. At UCSD, he was associate professor of biomedical informatics and the director of informatics for the Clinical and Translational Research Institute, leading the development and deployment of a clinical data warehouse, research registries and clinical trials management system.

Boxwala has published more than 80 peer-reviewed publications and abstracts, and he has presented his research at national and international conferences. He is also an elected fellow of the American College of Medical Informatics. •

KATHRYN L. LOFTIS

Ph.D., CAISS, NC State BME Class of 2007

Loftis' current work focuses on soldier survivability.

Loftis works as a contract researcher and analyst for the U.S. Army Research Laboratory.

Loftis has worked with the Joint Trauma Analysis and Prevention of Injury in Combat program.

DR. KATHRYN LOFTIS is currently a biomedical engineering contractor for Altus Engineering and serves as a researcher and analyst for the U.S. Army Research Laboratory. Loftis earned her Bachelor of Science in Biomedical Engineering from North Carolina State University in 2007. She received her Master of Science degree (2009) and Doctorate of Philosophy (2013) in Biomedical Engineering from the joint Center for Injury Biomechanics at Wake Forest University and Virginia Tech, with a specialty in injury biomechanics. Her work has included motor vehicle crash injury research, soldier survivability and injury causation. Loftis is also a Certified Abbreviated Injury Scale Specialist (CAISS) and an active faculty member for the Association for the Advancement of Automotive Medicine (AAAM).

In her undergraduate work at NC State, Loftis enjoyed biomechanics labs with Dr. Peter Mente, where she received hands-on experience investigating bone strength with porcine femurs. It was an interesting combination of mechanical engineering and anatomy and physiology. The UNC/NC State BME Department encouraged summer research projects, which she pursued at Wake Forest. There she was introduced to the biomechanics of traumatic injury, leading to graduate school in the Joint Center for Injury Biomechanics. Loftis' main focus in graduate school was motor vehicle crash injuries and vehicle safety, and she worked extensively with the Crash Injury Research and Engineering Network (CIREN) through the Department of Transportation. This multidisciplinary project allowed Loftis to work with medical doctors, radiologists, vehicle engineers and other injury experts to investigate injury causation. Loftis now applies these skills to her current job, where she investigates injuries occurring on the battlefield to improve soldier survivability. Her work with the military has included body armor analysis and participation in the Joint Trauma Analysis and Prevention of Injury in Combat (JTAPIC) program, which is a network of partners across the Department of Defense devoted to preventing injuries through actionable analysis of real-world data from theater. •

Entrepreneurial engineering

Department creates **i4 competition** with donor's help

The Triangle Medical Innovations team of (from left) Emily Nguyen, Hunter Reavis, Sam Warner, Jared Robertson, Brinnae Bent and Kierra Falbo earned a third-place award for their device to improve patient safety during brain tumor resections.

The SymPulse Medical team of (from left) Taylor Langley, Will Pfitzner, Chelsea Hamrick, Ryan Bolick, Vishal Ruparelia and Siddhu Vadakkeveedu earned a second-place award for their novel solutions in wound irrigation.

THANKS TO THE GENEROUS FUNDING of an anonymous donor to the University of North Carolina at Chapel Hill College of Arts and Sciences Foundation, the 2015-16 academic year marked the inaugural year for the UNC/NC State Joint Department of Biomedical Engineering's i4 Program.

Fusing engineering education and biomedical entrepreneurship, the i4 program aims to provide financial support to undergraduate BME students who want to see their ideas come to life.

i4 is composed of four stages: Identification, Ideation, Innovation and Implementation. In 2015-16, the team of Adi Blanc, Chase Monckton and Kaity Emerson applied these four steps to their Solutions in Ano idea, which received the first place award of $15,000. After extensive research, the Solutions in Ano team redesigned the anal fistula plug treatment in a manner that prevents early extrusion and creates a tight seal between the wound and the toxic environment of the rectum for the duration of the healing process.

The Solutions in Ano team of (from left) Kaity Emerson, Chase Monckton and Adi Blanc won the i4 competition with their redesigned anal fistula plug that prevents early extrusion and aids the healing process.

The second-place award of $10,000 was presented to the SymPulse Medical team that included BME students Will Pfitzner, Vishal Ruparelia, Siddhu Vadakkeveedu, Chelsea Hamrick, Ryan Bolick and Taylor Langley. SymPulse Medical was focused on creating novel, non-powered solutions in wound irrigation for use in the operating room and emerging markets.

Triangle Medical Innovations, which was a joint UNC/NC State BME student team including Emily Nguyen, Hunter Reavis, Sam Warner, Jared Robertson, Brinnae Bent and Kierra Falbo, received the third-place award of $5,000 to prototype a new device that aims to improve patient safety and save time during brain tumor resections.

In addition to the opportunity to compete for monetary prizes, participants had the experience of creating prototypes (as engineers) and presenting their solutions to a panel of judges (as entrepreneurs).

After the competition's successful inaugural year, the BME Department plans to build on the unique opportunities and resources of the i4 program next year by improving recruitment of younger underclassmen teams, increasing access to local startup resources and providing more opportunities for mentorship. Seminars and workshops are being planned as a resource for students and teams to enhance the development of student projects.

As successful as the i4 program has been thus far, it would not be attainable without the generous support of our anonymous donor who is providing undergraduates the opportunity to make a difference in the medical field. •

Making a difference

Endowed professorships **attract**, retain a top faculty

Dr. Ross Lampe Jr.

Dr. Fran Ligler

MANY FACTORS INFLUENCE the national reputation of a department but among the most critical is having the best faculty. Since its inception, the UNC/NC State Joint Department of Biomedical Engineering has focused on recruiting and retaining a top faculty to build its core strengths in research and education.

The support of an endowed professorship — a position permanently paid for with the revenue from an endowment fund — is one of the best tools to recruit and retain great faculty members.

"Endowed professorships allow us to compete with other highly ranked biomedical engineering departments across the country, drawing the best faculty to our department," said Kyle Gray, director of development.

One benefactor, Dr. Ross Lampe Jr., understands the importance of having an excellent faculty and believes that professorships are an effective way to help recruit. He is also motivated by the kind of impact that an endowed professorship can have on the research supported by the professorship.

The grandson of J. Harold Lampe, the longest-serving dean of the College of Engineering at NC State, Lampe is among 15 members of the Lampe family who have attended NC State over the past 70 years.

Lampe has endowed several professorships in the College of Engineering at NC State; one is in the UNC/NC State Joint Department of Biomedical Engineering. In 2013, the Department announced the hiring of Dr. Fran Ligler as the inaugural Lampe Distinguished Professor of Biomedical Engineering.

"The Department would not have been able to recruit a professor of Dr. Ligler's caliber without an endowed chair," said Dr. Nancy Allbritton, Kenan Professor and chair of the department.

A member of the National Academy of Engineering currently serving a term as an NAE Councillor, Ligler came to the Department with 28 years of experience gained at the U.S. Naval Research Laboratory in Washington, DC, as senior scientist for biosensors and biomaterials. She holds patents that have led to 11 commercial biosensor products — devices that use biological materials to monitor the presence of chemicals in a substance.

Having a faculty position with access to both the School of Medicine at UNC-Chapel Hill and the College of Engineering at NC State University was also a selling point for Ligler, as was the distinguished professorship.

"Biomedical engineering is very interdisciplinary and has the potential to create high-impact products that improve the lives of people around the world," said Ligler. "With the Lampe endowment, we are able to focus on areas of critical need and find ways to improve patients' health and well-being."

Endowed professorships are not only a recruiting and retention tool for gaining new faculty members. They also add prestige to the position, and through the creation of a distinguished professorship, the donor's name becomes the title for the position.

"It's an added recognition that gives credibility to the professorship and links the donor with the important work carried out by the recipient. It also acts as an institutional reminder that brings recognition to the donor," said Gray.

For information on how to fund an endowed professorship, contact Kyle Gray at **919.923.4908**, **khgray@ncsu.edu** or **kyle_gray@med.unc.edu**. •

ALUMNI NEWS

WE WANT TO HEAR FROM YOU

Reception and Alumni Career Panel for BME Juniors on November 30

You and other UNC/NC State BME alumni and friends are invited to attend a reception and alumni career panel discussion for BME juniors on **Wednesday, November 30, from 5:30 until 7:30 p.m. at The Frontier in RTP**. A six-member panel of BME alumni from RTP medical device and biotech companies will provide current BME juniors (class of 2018) with career advice as they start their job search for the 2017-18 academic year. If you would like to attend, RSVP to **UNCBME@unc.edu** or **khgray@ncsu.edu**.

10th Reunion for NC State BME Class of 2007

We look forward to welcoming back NC State BME Class of 2007 for its 10-year Reunion during the BME Senior Design Symposium and i4 Final Pitch on **Thursday, April 27, 2017**. The Reunion is being organized by Dr. Kathryn Loftis ('07). Interested alumni should contact Kathryn at **klloftis@gmail.com**.

NC State BME Class of 2007

Dr. Woodrow Benson

Woodrow Benson, MD, Ph.D., UNC BME Class of 1970

In recognition of his extraordinary contribution to the diagnosis and management of arrhythmias in children, Dr. Woodrow Benson received a Lifetime Achievement Award from the Pediatric & Congenital Electrophysiology Society (PACES) at the annual meeting of the Heart Rhythm Society on May 4, 2016.

Alex Eller, NC State BME Class of 2011

Alex Eller

Alex Eller is a product manager at Bioventus LLC. She enjoys clay shooting, bow hunting and traveling. Alex is pictured at left with Gus, her 4-year-old Weimaraner.

Curtis Hudson

Curtis Hudson, NC State BME Class of 2015

Curtis Hudson began working at Teleflex Inc. in January 2016 as an associate engineer for the Research & Development Respiratory group in Morrisville, NC. His personal milestone was undergoing reconstructive jaw surgery in August, and he is recovering nicely. Curtis is happy to be designing medical devices and is part of an excellent team at Teleflex.

Shelly (Strickland) Lowery, MD, NC State BME Class of 2004

After graduating from NC State with a double major in biomedical and biological engineering, Shelly Lowery earned a medical degree from the Brody School of Medicine at ECU in 2008. After completing a residency in family medicine, she settled in her hometown of Pembroke, NC, where she lives with her husband, Derek, and their children, Ben (3 weeks) and Tessa (4).

Harris McMurry, M.S., UNC BME Class of 1989

Harris McMurry spent 12 years with the Department of Radiation Oncology at UNC Hospitals as part of the medical physics team. He then joined the Oncology Division of Siemens Healthcare, where his 21-year career spanned regional sales, national management and worldwide start-ups before he retired as director of oncology collaborations in 2012. McMurry is an active board member of the Forbeck Foundation, a progressive cancer research organization, and has recently joined the UNC/NC State BME Development Advisory Board.

Beth Meyerand, Ph.D., M.S., UNC BME Class of 1992

Beth Meyerand is a professor in the biomedical engineering and medical physics departments at the University of Wisconsin-Madison. She recently stepped down after six years as chair of the BME department. Under her leadership, the department increased its faculty numbers by one-third, doubled its undergraduate enrollment and increased its philanthropic dollars by a factor of eight. Beth is on sabbatical this semester and looks forward to devoting time to her U01 grant to create a human brain connectome for patients with epilepsy.

Adam Nathan, M.S., NC State BME Class of 2014

Adam Nathan, third from left, was married in Houston, Texas in 2016. He is shown with, from left, his father, Anthony; wife, Morgan; mother, Angela; and brother Kevin.

After graduating with a B.S. in BME, Adam Nathan spent two months in Rwanda working as an engineer at a hospital on the outskirts of the country. Upon returning, he attended Texas A&M for graduate school, where he joined a biomedical research lab that worked on implantable devices to prevent aneurysm rupture. Nathan married this summer and now works at Alcon Surgical in Houston, Texas.

Andrew Pavlina, MD, UNC BME Class of 2010

Andrew Pavlina with his wife, Janna

After graduation from UNC, Andrew Pavlina worked at a contract research organization for a year before attending Indiana University School of Medicine. He is currently a radiology resident at the University of Cincinnati, with an

interest in becoming an interventional radiologist. Earlier this year, he married Janna Peacock, a fellow UNC '10 graduate.

Dr. Tojan B. Rahhal

Tojan B. Rahhal, Ph.D., NC State BME Class of 2012

Dr. Tojan Rahhal graduated from the NC State BME program in 2012 before going on to earn a Ph.D. in Pharmaceutical Sciences from UNC-Chapel Hill. At UNC, she worked with Dr. Joseph DeSimone on the pulmonary delivery of therapeutics using nanotechnology, and she was actively involved with the women in science group and several science outreach programs. She also founded a cross-cultural leadership development program for School of Pharmacy students that has since been presented to other departments. She graduated in May 2016 and was married this summer. Tojan is currently living in Columbia, Missouri.

Dr. Sharlini Sankaran

Sharlini Sankaran, Ph.D., UNC BME Class of 2007

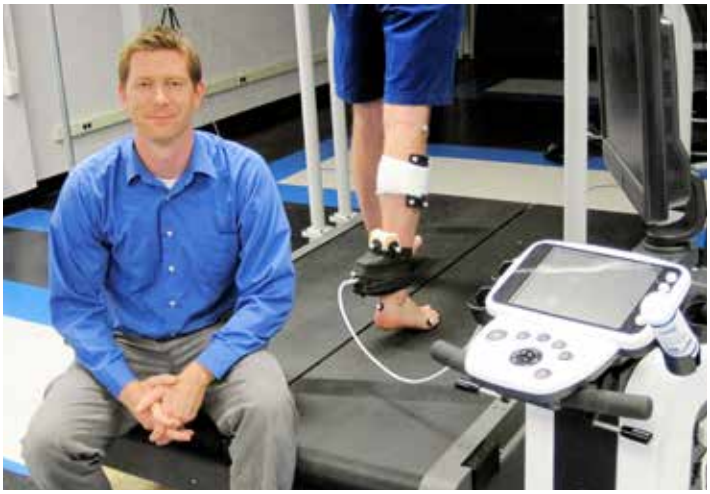
Dr. Sharlini Sankaran has been named executive director of the Duke Regeneration Next Initiative (**www.regenerationnext.duke.edu)**. She is responsible for leading and growing multidisciplinary collaborative efforts in regenerative medicine at Duke. In addition to increasing awareness of regenerative medicine research at Duke, she will oversee activities such as faculty and postdoc recruitment, graduate training, funding opportunities, collaborative projects and conferences. Sharlini has more than a decade's experience managing research and grant programs at the university, state and non-profit levels, and she is excited to put her multidisciplinary background to good use in building a strong regenerative medicine community at Duke University. She can be reached at **sharlini.sankaran@duke.edu**.

Kiran Venkatesh, MD, UNC BME Class of 2004

Dr. Kiran Venkatesh graduated from UNC School of Medicine in 2009. He completed an internal medicine residency at UNC in 2012 and currently holds a cardiology fellowship at the University of Massachusetts Medical School. •

Please share your personal and professional milestones with us! To submit an item for the Summer 2017 newsletter, send it by March 30 to UNCBME@unc.edu or khgray@ncsu.edu. Be sure to include your name and class year.

FACULTY NEWS



Dr. Jason Franz

Dr. Richard Goldberg Receives Award from UNC Center for Faculty Excellence

BME faculty member Dr. Richard Goldberg received a UNC Center for Faculty Excellence Presentation Award. This award is predicated on the growing number of faculty members interested in sharing the results of their work in the classroom, known as the scholarship of teaching and learning (SoTL). The Presentation Award subsidizes costs associated with presenting SoTL study findings at a local, regional, national or international conference

Staff members recognized with Star Heel Awards

Cherie Price (left) and Dr. Cheri Simpson

Dr. Cheri Simpson, BME's director of departmental initiatives, and Cherie Price, assistant human resources manager, were each recognized by the UNC-Chapel Hill Office of Human Resources with a Star Heel Award. This honor is based on nominations from colleagues and comes with a VISA gift card. We are proud of our two Star Heels!

May 2016: BME Researchers Awarded Major NIH Grant to Study Aging Tendon

BME faculty member Dr. Jason Franz and collaborators from the University of Wisconsin-Madison and the University of Virginia have been awarded a five-year NIH R01 award to study the role of age-related changes in tendon on motor performance. Franz' lab will combine dynamic ultrasound imaging, quantitative motion capture, and biofeedback to investigate changes in localized Achilles tendon mechanics across its lifespan, as well as the effects on leg muscle contractile behavior and motor coordination during walking. Collaborators at the University of Wisconsin-Madison will employ dynamic MRI and shear wave elastography to characterize triceps surae muscle-tendon architecture and elasticity, and both sites will contribute their imaging work to the development and validation of multi-scale computational models of 3D muscle and tendon tissue mechanics at the University of Virginia.

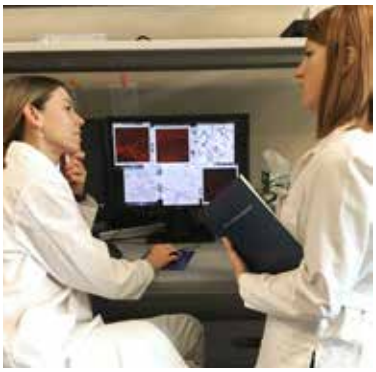
Joint Department Featured in Xconomy Article

A recent article (**bit.ly/1QXIhQx**) by Frank Vinluan of the Xconomy team features the UNC/NC State Joint Department and the impact we have on the local biomedical engineering scene. Several BME faculty members are profiled, and the collaborative and entrepreneurial nature of our Department is explored in the article. The article also describes how BME students are able to make their mark so early in their careers, with the hope that they will go on to impact the companies and the technologies being developed in the Research Triangle today — or better yet, create their own. "Joint Biomedical Engineering Program Bridges Campuses on Tobacco Road" is a thorough and descriptive summary of how the Department has had — and will continue to have — a positive impact on the biomedical engineering field.

Dr. Ashley Brown Awarded NC State Faculty Research and Professional Development Grant

BME faculty member Dr. Ashley Brown is the recipient of a 2016 NC State Faculty Research and Professional Development (FRPD) Grant. The grant program was established to assist faculty members in initiating research and professional development activities, and to provide seed funding to pursue larger awards and grants from outside agencies.

Dr. Ashley Brown Publishes Breakthrough Neonatal Care Study



Dr. Ashley Brown and Dr. Erin Sproul

Dr. Ashley Brown works closely with several different teams to assess the state of biomedical engineering as it relates to neonatal care. In one of her recent studies, Brown found that the current standard of using adult blood products in neonatal environments may cause post-surgical complications in patients. The results of this study suggest that postoperative bleeding, commonly seen after cardiac surgery in neonates, may be caused by the use of adult blood products that do not integrate well with neonatal blood clotting factors. These findings provide a huge opportunity for the advancement of neonatal care and were subsequently published in the top journal *Anesthesiology*.

Dr. Fran Ligler Delivers Keynote Speech at Nepalese Biomedical Engineering Symposium

Dr. Fran Ligler (right)

In April, Dr. Fran Ligler went on an adventure to Nepal that included presenting the keynote speech at a Kathmandu Institute of Applied Sciences (KIAS) symposium titled "Research in Applied Sciences: Challenges and Opportunities." In front of more than 250 individuals, Ligler delivered an engaging speech about the importance of increasing the awareness of the biomedical field in developing countries. Afterward, she was presented with a plaque of appreciation for her inspiring words and message of encouragement.

Two BME Seniors Win Top Awards from NC State's College of Engineering

Toluwalope Oyelowo (right)

Michaela Rikard (right)

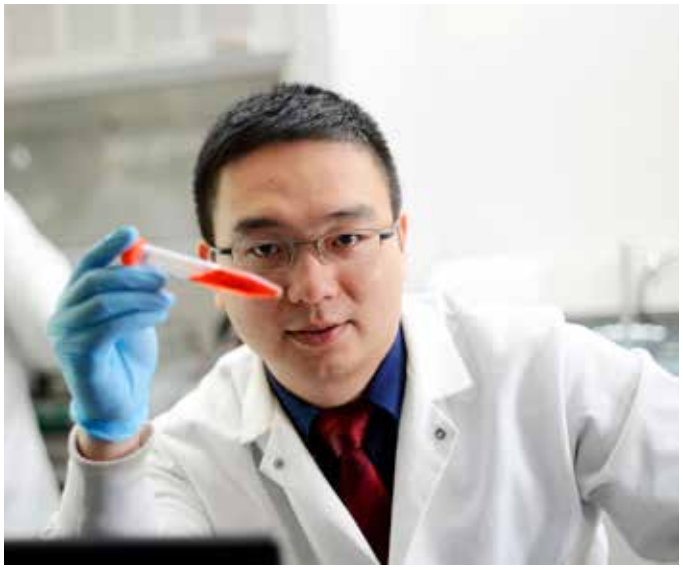
Toluwalope Oyelowo and Michaela Rikard are no strangers to accomplishment — the NC State BME seniors were recognized as winners of the 2016 College of Engineering Outstanding Senior Awards. Toluwalope (or Tolu, to her peers) received the award for Leadership as a result of her academic endeavors and extracurricular activities. Michaela received the award for Scholarly Achievement, having worked in several labs during her undergraduate career and boasting four publications before graduating. Both of these outstanding students were active in a number of campus groups and maintained high standards in all aspects of their academic lives. BME faculty members and staff are proud of Tolu and Michaela and look forward to their future accomplishments.

Doctoral Student Adam Vandergriff Awarded American Heart Association Predoctoral Fellowship

Adam Vandergriff, a BME doctoral student working under Dr. Ke Cheng, has received a Predoctoral Fellowship from the American Heart Association. This fellowship provides two years of doctoral support and will help

Adam to further study the relationship between stem cell therapy and cardiovascular diseases. Adam's outstanding research, coupled with his numerous publications, made him an excellent candidate for the award. His proposed research was so well received that it was marked in the top .01 percent of all submissions.

Zhen Gu Invited to 2016 National Academy of Engineering Symposium



Dr. Zhen Gu

The National Academy of Engineering's U.S. Frontiers of Engineering Symposium is an elite event: Only 83 of the brightest young engineers from around the U.S. are invited to participate. This year, Dr. Zhen Gu was one of the few invitees as a result of his groundbreaking and exceptional research initiatives. Gu joined 82 other engineers at a two-day program in September that covered cutting-edge engineering developments in a variety of fields.

Stem Cell's Exit from Bloodstream Documented for First Time

This way out: NC State researchers have discovered the process by which stem cells leave the bloodstream. With oversight by Dr. Ke Cheng, a researcher team set out to identify how, exactly, stem cells exit the bloodstream when needed at a site of infection. Accepted wisdom suggested that stem cells behave similarly to white blood cells, modifying their shape to squeeze through the walls of the blood vessel. After using a zebrafish model to study the process, however, the team discovered that stem cells behave very differently from their infection-fighting cousins. In this new process dubbed "angiopellosis," the stem cells are actually passive; endothelial cells that constitute the blood vessels are the dynamic participants that actively work to expel the stem cells in the correct location. Moreover, the team found that angiopellosis allowed for multiple cells to exit simultaneously, although the process took hours (as opposed to single cells and minutes, in the case of white blood cells). This discovery could have major implications for how we administer stem cell therapies and could impact how we can fight similar cells, such as those found in metastatic cancers.

You can read more about the study from NC State News (**news.ncsu.edu/2016/06/angiopellosis**). The paper, published online in *Stem Cells*, was first authored by doctoral student Tyler Allen and featured Cheng as faculty author.

Ph.D. Student Yue Wen Selected as Finalist in IEEE Paper Competition

Yue Wen, a Ph.D. student working with Dr. Helen Huang, has been chosen by the IEEE Engineering in Medicine and Biology Society as a finalist in the organization's annual student paper competition. The IEEE committee selected 15 out of nearly 300 entries to compete for the top award, which was given in August at the Annual IEEE International Conference.

Biomedical Imaging Graduate Certificate Launches

Our Joint Department of Biomedical Engineering has teamed up with the UNC-Chapel Hill Departments of Psychology and Neuroscience to announce the launch of a graduate certificate in Biomedical Imaging Science. Biomedical imaging is a critical area of research with far-reaching scientific and clinical translational opportunities in several areas, including cancer, developmental science, genetics, pharmacology, neuroscience and biomedical informatics. The new certificate program combines didactic coursework with symposia and workshops at UNC's Biomedical Research Imaging Center (BRIC), as well as practicum placement for research training in an on-campus research lab. Leveraging both the faculty expertise and technological resources of the UNC Biomedical

Research Imaging Center, the program will provide students the opportunity to learn broadly about the biomedical imaging sciences while also selecting a specific imaging modality for more specific training.

The Biomedical Imaging Science Certificate requires four three-credit courses and a three-credit practicum, and is in addition to the student's Departmental or Program degrees. Simultaneous enrollment in a UNC graduate program is required.

"This Is What Science Looks Like at NC State" Article Features BME Grad Scott Vu

Scott Vu and his dance partner, Lisa Falcone

BME alumnus Dr. Scott Vu was featured in a recent installment of "This is what science looks like at NC State," a behind-the-scenes series that highlights the personal lives of NC State scientists. The full article is available at **news.ncsu.edu/2016/07/science-looks-like-scott-vu**.

BME Graduate Student Yue Lu Receives Research Award

BME graduate student Yue Lu attended the 2016 annual meeting of the Controlled Release Society, where she was honored with the Graduate Research Award. This award acknowledges dedication and contributions to delivery science by a graduate student.

NC State's Chancellor's Innovation Grant Awarded to BME Research Team

Drs. Fran Ligler, Glenn Walker and Brian Cummins are all part of the BME research team that took home one of NC State's 2016 Chancellor's Innovation Fund grants. These awards, managed by the NC State Office of Technology Transfer, are given to help NC State researchers move innovative discoveries from the lab bench to the marketplace. The team was commended for their "lab-on-a-chip" work, which is paving the way for faster and more accurate patient diagnoses. Read more about their work, and the work of the other six awardees, at **news.ncsu.edu/2016/08/chancellors-innovation-fund-fy17**.

Dr. Zhen Gu Featured in STAT News Article

An article about Dr. Zhen Gu was published in the *The Boston Globe* in August 2016.

Popular news sources often run stories about scientists and their research, but it's not every day that they include the researcher's background and what propels them to succeed. Recently, however, Dr. Zhen Gu was featured in "Scientist's drive for a cancer cure

inspired by the father he doesn't remember" (**statnews.com/2016/08/16/cancer-cure-zhen-gu**), an article by *STAT News* that was later reported in *The Boston Globe*. The article describes how Gu's life experiences have inspired his scientific explorations. Specifically, the article explores his current work in diabetic and cancer drug delivery systems, two areas in which he is at the forefront of innovation.

NC State Research Grants Awarded to Two BME Undergraduates

Innovative and promising undergraduate students Mario Castaneda and Ben Igo have been awarded 2016-2017 NC State Undergraduate Research Grant Awards. These prestigious awards are given each year to students or student teams that have developed research ideas that embody the NC State motto of "Think and Do." Castaneda and Igo have also been asked to present their research at the 2017 NC State Undergraduate Research Symposium, which is a testament to their hard work and dedication to biomedical engineering. Both students work with Dr. Ashley Brown in the Advanced Wound Repair lab.

NC State BME Department Co-Hosts 40th Annual American Society of Biomechanics Meeting

This summer the departments of Mechanical and Aerospace Engineering and Biomedical Engineering at NC State jointly hosted the 40th Annual Meeting of the American Society of Biomechanics (ASB40), led by Meeting Chair Dr. Katherine Saul (MAE) and co-Chair Dr. Greg Sawicki (BME). It was an exciting and successful meeting that brought more than 900 national and international researchers and more than 30 industry exhibitors and sponsors to Raleigh and NC State. Attendees shared their cutting-edge research, learned about the newest technology and equipment and experienced all that NC State and Raleigh have to offer. Kick-off events brought more than 300 meeting attendees and local students and families to Centennial Campus. In the morning, we showcased biomechanics educational activities and demonstrations developed by the ASB membership for the ASB40 Outreach Expo at NC State's James B. Hunt Jr. Library, sponsored by the National Institutes of Health. Large crowds of local student groups and members of the general public attended to learn about biomechanics concepts and how to translate them to the middle or high school classroom. Afternoon lab tours allowed visitors to check out some of our most exciting biomechanics lab spaces in Engineering Building 3 and the ultra-modern Hunt Library.

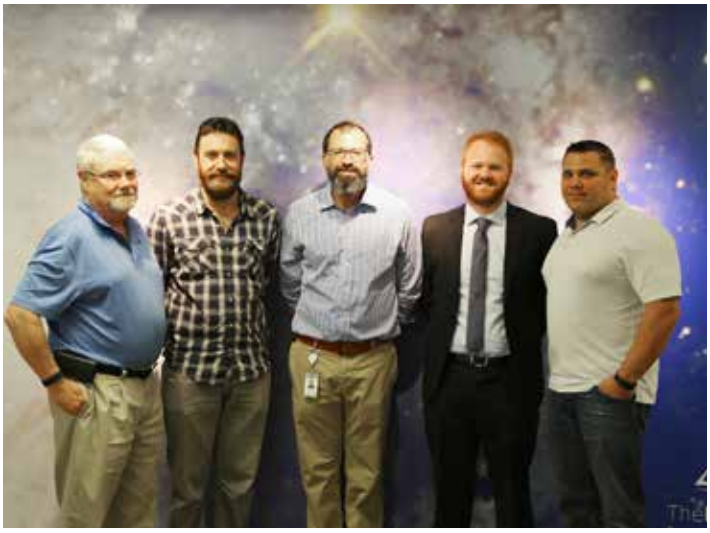
The ASB event featured a banquet at the NC Museum of Natural Sciences.

UNC/NC State BME Faculty and Student Team Receives Catalysts for Innovation Grant

The Medical Innovators Collaborative (MEDIC) started by Preston Linn, Tim Martin, Andrew DiMeo and Andy Taylor of the UNC/NC State Department of Biomedical Engineering were awarded one of two RTP Catalysts for Innovation grants in July 2016. The $85,000 MEDIC grant was given through a partnership between the Research Triangle Park; Kenan Institute for Engineering, Technology, & Science (KIETS) at NC State University; University of North Carolina at Chapel Hill; and TUCASI.

MEDIC is a new veteran-focused spinout of the UNC/NC State Department of Biomedical Engineering. Drs. Jason Long and Andrew DiMeo met at the UNC Surgery/UNC/NC State BME Speed Dating Event and conceptualized the original idea and secured a $10,000 gift from UNC Lineberger Cancer Center to launch the initiative. MEDIC is a product of the student team, led by Andy Taylor, who was enrolled in the Medtech-ID

Dr. Andrew DiMeo (left), associate professor of the practice, greets Mason Ailstock (right), chief operating officer of Research Triangle Park, and Dean Bundschu, executive director of Bunker Labs RDU, at the event where MEDIC was announced as a Catalysts for Innovation grant recipient.



Attending the Catalysts for Innovation grant announcement were (from left) Preston Linn, BME industry academic coordinator; Michael Penney, program manager for Bunker Labs; Andrew DiMeo; Andy Taylor, MEDIC program manager; and Dean Bundschu.

course. MEDIC becomes the latest graduate from design courses offered by the joint department, including Novocor Medical Systems, Augment Medical, Contour Surgical and 410 Medical.

MEDIC serves to support the innovation lifecycle and community by providing asset assessment and development, innovation training, industry relevant professional seminars, student internships and an IP Safe Haven. MEDIC will be an open and collaborative space bringing together innovators and entrepreneurs including academics, caregivers, industry professionals, students and veterans. MEDIC fills the gaps in early-stage biomedical concept realization while its strategic partner, Bunker Labs RDU, provides educational programming to help military veterans start and grow businesses. At the intersection of this partnership is a high-tech prototyping lab serving the community. MEDIC, Bunker Labs RDU and the Prototyping Lab are co-located at The Frontier in RTP. For more information, please contact Andy Taylor at **matayl10@ncsu.edu**.

BME Founding Faculty History Project

In September, a group of former faculty members including Drs. Frank Abrams, Susan Blanchard, Carol Lucas, Marian McCord and Troy Nagle met to launch the UNC/NC State BME Founding Faculty History Project. The goal for this project is to develop and execute a plan to document the rich and unique history of the UNC/NC State Joint Department of Biomedical Engineering on both the Raleigh and Chapel Hill campuses in time for the UNC BME 50th Anniversary in 2018. The planning group would like to receive any historical class photos, faculty photos and other relevant documents. Please email these items to **UNCBME@unc.edu** by January 30, 2017. •

BME founding faculty members (from left) Dr. Marian McCord, Dr. Susan Blanchard, Dr. Carol Lucas, Dr. Stephen Quint and Dr. Troy Nagle attended a planning lunch in September for the Department's history project.

THE IMPACT OF **PRIVATE GIFTS** ON BME SOPHOMORE ORIENTATION: **BETTER TOGETHER**

By Willa Ma

BME sophomores enjoyed barbecue and a baseball game at a joint orientation event in August.

AT THE START of the fall 2016 semester, sophomore biomedical engineering students from NC State University and UNC-Chapel Hill came together to be introduced to the BME joint program.

We are grateful to the generous BME alumni and other friends of the department who made personal gifts to the UNC Medical Foundation of NC and the NC State Engineering Foundation to fund the first-ever joint BME sophomore orientation. This event gave students like me our first glimpse of the unique, developing partnership between the two universities. Kicking off orientation, we had our first experience getting on the BME shuttle to The Pit in Durham. After the orientation, many walked to Durham Bulls Athletic Park for a free baseball cap and a game won by the Bulls.

As a student, it was important for me to see the investment that alumni have in the current undergraduates. At orientation, we were not only given a BME t-shirt, dinner and a ticket to a baseball game, but we also had the priceless opportunity to meet sophomores from both campuses and the faculty of the BME program.

Orientation featured several faculty members including NC State's Frank Abrams, who is credited for being a leader in developing the joint BME program.

As a sophomore settling into the BME major, the orientation gave me the opportunity to hear from notable design professors about introductory engineering classes. UNC-Chapel Hill's Kenny Donnelly and NC State's Andy Taylor teach the basics of engineering, from Solidworks to soldering circuits.

One of the major tips given by several speakers was to get involved in a lab by finding professors who do research in areas of study that are of interest. Fortunately, the BME joint program has faculty members like Jason

The first-ever joint orientation event for BME sophomores included dinner and a Durham Bulls baseball game.

The joint orientation event provided an opportunity for students from both campuses to interact and get to know one another.

Franz, Shawn Gomez and Jacque Cole, who have labs that welcome students interested in their work. In addition, the Lucas Scholar program and the Abrams Scholar program accept applications from students hoping to get research experience and internships.

While professors introduced their classes and research, upperclassmen BME students introduced their organizations like the BME Club and the Helping Hand Project. The BME club's primary goal is to give BME undergraduates the opportunity to get to know each other. Moreover, the Helping Hand Project is an initiative started by a BME student at UNC-Chapel Hill that creates low-cost, 3D printed prosthetic hands for children born without fingers.

As the event came to an end, the sophomore class left with a greater understanding of the BME program. For the first joint orientation for the BME Department, we have alumni and friends of the Department to thank for bringing the two universities together. Each individual who donated allowed us students to be properly welcomed to the program. Through their generosity, I was able to see the strength in the program, as the BME Department's priority is to equip us with the engineering skills that we can use to make a difference in the real world. •

THE HELPING HAND PROJECT AT UNC AND NC STATE

BME STUDENTS AND ALUMNI from both campuses made a presentation about the Helping Hand Project at the UNC/NC State BME Development Board meeting on October 27.

Founded at UNC by BME alumnus Jeff Powell, the Helping Hand Project is a non-profit organization that empowers and supports children with limb differences so they may feel positive about their anatomy and not view their circumstances in a negative light. Because of the expense, prosthetic hands are not an option for many children, creating a significant need.

The Helping Hand Project creates both open-source and custom 3D-printed hands. The standard hand is for children who have a palm and working wrist but are missing fingers. New custom designs are currently being developed for children with unique needs including those with above-the-wrist amputations. In addition, the Helping Hand Project at UNC connects children and families to each other and to outside support resources such as social workers. A gathering for the children and their families is held each semester in Chapel Hill. To learn more about the Helping Hand Project at UNC, visit **www.HelpingHandProject.org** or contact Jeff Powell at **jeffpowell101@gmail.com**.

The Helping Hand Project has now expanded to NC State, where a student club formed earlier this year. The NC State club has already created its first hand design, with the goal of producing individualized prosthetic hands for two children in need by January 2017. To learn more about the Helping Hand Project at NC State, visit **www.facebook.com/helpinghandncsu** or contact Emily Fawcett at **ebfawcet@ncsu.edu**. •

KYLE GRAY joined the Joint BME Department and NC State Engineering Foundation in January 2016 as the Department's director of development. He most recently served as director of development for UNC-Chapel Hill's Department of Allied Health Sciences (AHS) in the School of Medicine. During his tenure, the AHS donor base tripled, increasing cumulative donations by more than $10 million from 2006 to 2015. Gray came to AHS from UNC-Chapel Hill's School of Government, where he served as assistant dean for development and communications. Previously, he was a career specialist for Boston Private Industry Council at Boston Latin School and senior program instructor for the Close-Up Foundation in Washington, DC. Gray received a Master's Degree in Public Administration from UNC-Chapel Hill in 1997, and a Bachelor's Degree in Political Science with a minor in urban studies from The Colorado College in 1989.

Joint Department of
BIOMEDICAL ENGINEERING

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

NC STATE UNIVERSITY

Joint Department of Biomedical Engineering
University of North Carolina at Chapel Hill
Campus Box 7575
152 MacNider Hall
Chapel Hill, NC 27599-7575

Joint Department of Biomedical Engineering
North Carolina State University
Campus Box 7115
4130 Engineering Building III
Raleigh, NC 27695-7115

www.bme.unc.edu

UNC/NC State Private Giving Opportunities

The UNC/NC State Joint Department of Biomedical Engineering seeks private investment to capitalize on the collegial and fertile inter-institutional environment between UNC-Chapel Hill and NC State to become the best BME department worldwide. Private gifts will enable the Department to make strategic investments to bring in and keep the best people, launch bold new research and academic programs, and seed a culture of innovation through state-of-the-art labs on both campuses. With this investment, UNC/NC State BME will expand three core Department-wide initiatives.

INITIATIVE 1:
Be the world-renowned leader in research

We have created an unprecedented collaborative environment that promotes seamless exchange among engineers, clinicians and scientists.

PROMOTE COLLABORATION AND RESEARCH

To attract world-class scientists and engineers to North Carolina and expand our high-impact research and training programs, the Department seeks to add six endowed professorships (3 at NC State and 3 at UNC). The Department will also showcase its research and faculty, the universities and the state by sponsoring an international scientific meeting (held in North Carolina), as well as a distinguished lecture series.

INITIATIVE 2:
Recruit and educate exceptional students

BME is committed to educate a new generation of biomedical engineers expressly equipped to meet the complex yet vital societal challenges impacting the health of our nation.

INVEST IN EDUCATION AND ENTREPRENEURSHIP

To increase educational competitiveness, BME seeks funds to provide graduate and undergraduate fellowships and scholarships to students. Funds supporting our international exchange program will support our students to gain global experiences so that they are "market ready" upon graduation. BME seeks the infrastructure to provide continuing education to the citizens of North Carolina through the creation of a Professional Science Master's degree in medical technologies.

INITIATIVE 3:
Translate technology into economic growth

Our goal, which permeates every function of BME, is to create and translate practical solutions to health care needs. Students are taught not only the skills of the life sciences and engineering, but are also provided with hands-on experience in interdisciplinary teamwork. Faculty members collaborate with companies and also start new ones.

Seed Technology Transfer

To enhance technology translation and speed the transition of new technologies to the marketplace, BME seeks funding to increase the department's capacity to move new product designs out of the laboratories and to encourage greater entrepreneurship among faculty and students. In addition, a new BME Innovation Fund will be endowed to fund new faculty members and student research projects, departmental initiatives including international conferences, student and faculty professional development and ongoing department-wide strategic planning.

For more information about these and other opportunities to invest in UNC/NC State BME's mission to unite engineering and medicine to improve lives, please contact Kyle Gray, director of development at **khgray@ncsu.edu**, **kyle_gray@med.unc.edu** or **919.923.4908**.