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Volume 3, Issue 2 **Summer 2015**

Colorado State University
School of Biomedical Engineering

visitors >>>

The Company We Keep

Each semester, the School of Biomedical Engineering invites distinguished professors from around the world to speak on biomedical engineering research and related disciplines for its weekly seminar series. The Spring 2015 speakers included:

Dr. Julie Dunn
Medical Center of the Rockies

Dr. Bin He
University of Minnesota

Dr. Dawn Elliot
University of Delaware

Dr. Michelle Dawson
Georgia Tech

Dr. David Kaplan
Tufts University

Message from Director

Schools' strength built on collaboration

STUART TOBET, director

The School of Biomedical Engineering (SBME) began in 2007 as a self-assembled, interdisciplinary program that now comprises more than 45 faculty members drawn from more than a dozen departments from four colleges: Engineering, Veterinary Medicine and Biomedical Sciences, Natural Sciences, and Health and Human Sciences.

SBME is committed to promoting interdisciplinary collaborative research and education. Faculty are chosen for appointment to SBME based on scientific achievement, interest in growing and funding state-of-the-art research involving students, and willingness to collaborate with existing SBME faculty. Members of SBME are able to participate because of the support and commitment of the deans and department heads of the primary units in which the faculty reside.

Research strengths of the faculty include regenerative and rehabilitative medicine, imaging and medical devices, and diagnostics and therapeutics. Synergies among faculty are evident not only in their participation in the SBME, but also in their collaboration on research teams across campus. These include two new interdisciplinary Catalysts for Innovative Partnership teams: Coalition for Development and Implementation of Sensor Systems (CDISS) and Compatible Polymer Networks (CPN).

As well, a number of faculty are also members of two previously established collaborative centers: The Center for Immune & Regenerative Medicine, and the Cardiovascular Research Center. It is critical for SBME to help recruit the next generation trainees to help fulfill the promise of these research centers.

I value your feedback and welcome your questions. Feel free to reach out to me directly at Stuart.Tobet@colostate.edu or (970) 491-7157.

E-Days Biomedical Engineering Awards

On April 17, 2015, the School of Biomedical Engineering was proud to have their first cohort of biomedical engineering undergraduate students participate in Engineering Days (E-Days).

Four members of the School of Biomedical Engineering Advisory Board served as judges and provided four teams with cash awards for their outstanding achievements in biomedical engineering. Judging criteria included presentation, technical expertise, creativity, and overall impression.

From left: Dennis Schlaht, April Giles, Jeff Samson, and Steve Simske.

First place honors went to group members Alison Bailey, Blair Larson, Ilya Merkulovich, and Nicole Puissant (Chuck Henry, faculty advisor) for their "Amperometric Microfluidic Device with Incorporated Tissue Slice for Personalized Cancer" which explored the design of a microfluidic device capable of screening for individualized chemotherapy treatments, allowing direct, real-time feedback on drug efficacy via measured amperometric signals. The goal is to improve personalization of cancer treatment to offer patients a greater chance of life.

Second place was awarded to group members John Haverkamp, Matt Marrapode, Aaron Paulding, Craig Sandoval, Amy Schlagel, and Lane Taylor for their Covidien-sponsored "Prototypes for Delivering Depth-Controlled Release of Argon to Cut and Coagulate Colon Tissue" which included the development and construction of two argon plasma ablation (APC) devices: one with a forward, axially firing nozzle and the other with a side, perpendicularly firing nozzle. The testing data is to serve as proof of concept to determine whether burn depth can be controlled using this technology.

Second Place Team. **From left:** Amy Schlagel, Aaron Paulding, Matt Marrapode, Lane Taylor, and John Haverkamp.

Third place was awarded to group members Ashley Beckwith, Hillary Haws, Dalton Noren, and Josh Pickrell for their Terumo BCT-sponsored "In-Line Cellular Lysis Device" which focuses on developing a flow-through cellular lysis device that minimizes human involvement and handles large volumes of cellular medium with the sensitivity of smaller-scale operations. This device is part of a larger system which will culture and lyse E.coli prior to harvesting intracellular proteins. This automated, large-capacity, cell-lysing device will provide efficient and repeatable yields of viable cellular components.

First Place Team. **From left:** Ilya Merkulovich, Nicole Puissant, Blair Larson, and Alison Bailey.

In addition to awarding the best biomedical engineering project created by biomedical engineering majors, the SBME Advisory Board judges also acknowledged the best biomedical engineering project created by non-biomedical engineering majors. This honor was awarded to a mechanical engineering team of Jake Butinsky, Sally Runions, Joe Sernett, and Jamie Urban for their "Biomass Combustion Human Exposure Chamber" sponsored by the National Institutes of Health.

Third Place Team. **From left:** Josh Pickrell, Hillary Haws, Dalton Noren, and Ashley Beckwith.

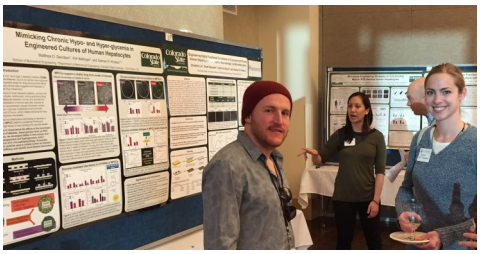
E-Days provides undergraduate engineering students an opportunity to showcase the completion of their senior design projects to faculty, family, industry representatives, and peers. It helps students develop practical, hands-on skills and teaches them how to succeed in an integrated, interdisciplinary engineering design environment.

SBME's Second Annual First Generation Dinner was held on February 23 to honor, recognize, and connect first generation students with biomedical engineering faculty and staff. CSU defines 'first generation' as students whose parents did not receive a bachelor's (or higher) degree. The event attracted over 15 students, 6 faculty, and 5 staff members, including Barb Musslewhite with the CSU First Generation program and Neely Clapp from TILT. Student feedback was overwhelmingly positive and a consistent theme was appreciation for meeting other first-generation students, the approachability of faculty, and the friendly, accessible staff.

event update >>>

Grad Day Poster Session & Awards

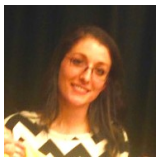
On Monday, March 2, the School of Biomedical Engineering hosted its annual Graduate Interview Day Social for Ph.D. candidates seeking admission to the Bioengineering program.



At the event, current students showcased their research while faculty, prospective students, and SBME advisory board members mingled and judged student posters. Prizes were awarded to students with the best posters and presentations.

First place was awarded to **Lei Wang**, graduate student in Dr. David Dandy's lab.

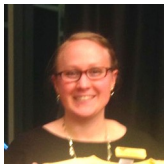
Second place was awarded to **Bryce Schroder**, graduate student in Dr. Diego Krapf's lab.



Third place was awarded to **Kristine Fischenich**, graduate student in Dr. Tammy Donahue's lab.

Dustin Berger was awarded the Student Academic Award.

Michelle Mellenthin and **Zach Lerner** were awarded Outstanding Graduate Student Awards.



Dr. Salman Khetani was awarded the Excellence in Teaching award.

alumni update >>>

BME Class Notes

Tim Ruckh ('10 Ph.D. Bioengineering) works at Google in Mountain View, CA. Prior to moving to California, he completed his postdoc in July 2014 at Northeastern University in Boston. Ruckh is currently engaged and spends his free time mountain biking, hiking, traveling, and visiting wineries.

SBME Faculty Member Appointed to University Chair

Nicole Ehrhart, professor of surgical oncology and biomedical engineering, is the first woman at CSU appointed to a university chair, endowed with $3 million in donations.

Ehrhart will be appointed to the Ross M. Wilkins, M.D., Limb Preservation University Chair in Musculoskeletal Biology and Oncology, named for Dr. Ross Wilkins, a Denver orthopedic surgeon. He has collaborated closely with Dr. Stephen Withrow, a veterinarian, University Distinguished Professor, and founder of CSU's Flint Animal Cancer Center.

Ehrhart is dedicating her career to saving the limbs and lives of trauma victims and cancer patients and is continuing the university's work of limb-sparing cancer discoveries.

Congratulations to the First Cohort of CSU

BS BME & BS Electrical Engineering

BS BME & BS Mechanical Engineering

BS BME & BS Chemical/Biological Engineering

Omar Abdulla

Our first international student, Omar is on track to cross the stage in fall 2015 with his degrees in biomedical and mechanical engineering. However, his dream of making a difference can't wait until then. Recently, he launched a company called "Jusour," meaning "bridges" in Arabic. Omar will use his foundation in engineering to empower his entrepreneurial spirit as he works to make technologies in medicine and engineering more accessible for everyone.

Alison Bailey

Alison supplemented her BME coursework by serving as the vice president of the International Society of Pharmaceutical Engineers, and contributing to Dr. Tammy Donahue's Soft Tissue Mechanics Laboratory lab, which integrates biology and engineering, leading to a better understanding of the mechanical behavior and cellular responses of biological tissues; namely the knee joint meniscus. She has begun her career at Hyde

Hilary Haws

In addition to completing her biomedical and mechanical engineering degrees, Hilary made a difference to hundreds of undergraduate CSU students as a TILT Math tutor. And, after successfully completing an internship at Beckman Coulter last summer, they offered her a full-time engineering position. She is starting her career working on the designs of flow cytometers and other medical instruments for researchers around the world.

Blair Larson

An honors scholar, Blair also worked on campus in Dr. Tammy Donahue's research lab doing histology and mechanical testing on osteoarthritic cartilage. In addition, she landed a coveted internship with Dohman/Reglera during her last semester in her biomedical and chemical and biological engineering program. After graduating, Blair began her career at Terumo BCT, where she is contributing to the Spectra Optia team.

Matt Marrapode

Matt joined CSU after exploring various academic options, including studying in New Zealand. He received the BME Outstanding Service award at this year's E-Days for his work helping youth, his leadership roles on and off the ultimate frisbee field, and for helping to build a new mentoring program for SBME. Matt will be starting his career as a product development engineer for Medtronic.

Aaron Paulding

Aaron's interests have spanned many areas over the years—R&D, graduate school, and tissue engineering. His soft-spoken diligence carried him well, culminating in the highlight of his career, his senior design project—a medical device designed to improve treatment of ulcerative colitis. Aaron is beginning his career at Tolmar in Fort Collins.

Josh Pickrell

Josh has been instrumental in the success of the BME high school outreach program—not only did he develop hands-on projects, but the testing apparatus to see how well the projects worked, and his enthusiastic and knowledgeable presentation style was a hit with potential students. For the past two summers, he also interned at Covidien. As a software quality analyst, he brings all of these attributes to his new team at Terumo BCT.

Nicole Puissant

In addition to working with the College of Engineering recruiting team for several years, Nicole was president of the International Society of Pharmaceutical Engineers, and still found time to work on microfluidic devices in Dr. Chuck Henry's Lab. She interned at Terumo BCT last summer and was integral in helping form a senior design partnership with Terumo BCT. She was offered a full-time position and has begun her career at Terumo BCT.

Undergraduate Biomedical Engineering Students

Ashley Beckwith

Ashley's work ethic and intelligence have been evident in both her academic accomplishments and her five years in Dr. Sue James' lab, working on polymers to assist in better integration of joint replacements. She was the first BME tutor in the residence halls, studied abroad for a summer, and is an artist in her 'spare' time. Ashley received the "2014 Outstanding BME Academics" award and will be starting her career at Plexus.

Craig Ewell

As Craig once posted on social media, "From start to finish, CSU has been nothing but a blessing in my life! I have loved every moment of my time here. I am and will always be a RAM for life!" Craig was one of the first recipients of the SBME Scholarship for Leadership and Innovation. His enthusiasm has been an asset to the College of Engineering recruiting team. Craig is currently working as a sales engineer for Phoenix Contact.

John Haverkamp

"Always up for a challenge" was what John said one of the first times he was asked what it was that interested him about the biomedical engineering program at CSU. With quiet maturity, he has been a consistent presence and contributor to the biomedical engineering and mechanical engineering programs. His next career steps may take him out of state, or may keep him close to home. Either way, he will contribute.

Ilya Merkulovich

Ilya has been a pioneer not only in the first graduating BME class, but is the first student to compress a 5-year program into 4 years, given the numerous amount and sequencing of college credit he had accumulated in high school. His natural intellectual curiosity has served him well in his biomedical and mechanical engineering program and in his contributions to Dr. Popat's biomaterials lab.

Mikhail Naroditskiy

Mikhail's insightful questions have helped make him successful in the biomedical and mechanical engineering program. In addition to his academic successes, he is also third-degree black belt in Tae Kwon Do. Mikhail always shows great respect in and out of the classroom and is a contributor to anything he puts his mind to accomplish.

Dalton Noren

Dalton has the honor of being the first student to sign on with the BME program, in October 2010, a full year before the first BIOM 101 class began. In addition to being a pioneering student, Dalton is a husband and father and has been able to balance many competing priorities over the years. He is keeping his time management and engineering talents local, where he is working for Wasson-ECE Instrumentation as a chemical engineer.

Amy Schlagel

Amy loves a challenge, and has brought a consistent level-headed presence to her classes and to the BME program. After her third year, she interned at HP and worked on materials characterization and ended up working for them through the following academic year. She interned at Covidien last summer and was instrumental in having Covidien as a senior design partner.

Patrick Stockton

Patrick is a somewhat singular BME pioneer, as he is the only Biomedical and Electrical Engineering graduate. He is continuing his passion for lasers and optics by pursuing a 'fast-track' master's program with Dr. Randy Bartels. For the past five years, Patrick worked in on-campus research labs and found the experiences invaluable, as he could solidify engineering concepts when applying them to practical lab problems.

Lane Taylor

Lane's thoughtfulness, leadership, focus, and willingness to accept a challenge are signature traits. He worked in Dr. Dasi's cardiovascular and biofluid mechanics lab, interned at Covidien last summer, and was also integral to bringing Covidien on board as a senior design partner. Lane is starting his professional career at Medtronic as a medical equipment engineer.

National Science Foundation Grant Awards

NEW GRADUATE PROGRAM TACKLING "BIG DATA"

by Kortny Rolston

Colorado State University recently launched a new program to train graduate students in variety of scientific fields to sift through and make sense of complex biological data. CSU received a five-year, $2.97 million grant from the National Science Foundation to establish the interdisciplinary research and education program, which is known as Generating, Analyzing, and Understanding Sensory and Sequencing Information or GAUSSI.

The program, which got underway this summer, aims to cross-train students earning advanced degrees in biology, statistics, computer science, biomedical engineering, biomedical sciences, mathematics or cellular and molecular biology to tackle "big data." Recent advances in scientific instrumentation, technology and sensors have enabled researchers to generate reams of data cheaper and faster than ever before. But this steady stream of "big data" also comes with its own challenge – how to extract useful, meaningful information out of it.

"It's much easier these days to generate and collect data. The real question is how do we make sense of it and understand what it means," said Tom Chen, professor of electrical and computer engineering and biomedical engineering, and director of GAUSSI. "Everyone is facing the same issue."

Read the full story at http://source.colostate.edu/new-graduate-program-tackling-big-data/.

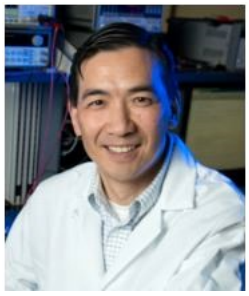
CSU LANDS $2 MILLION NSF GRANT TO REVAMP ENGINEERING EDUCATION

by Jeff Dodge

Colorado State University is one of only six schools in the country that has just been charged by the National Science Foundation with retooling the way engineering and computer science are taught.

Armed with a $2 million, five-year grant, CSU will break down the traditional approach of teaching one subject per course and replace it with a system in which students in electrical and computer engineering simultaneously learn how various components fit together in real-world applications.

"The current engineering educational system fails in two fundamentally critical ways," the CSU researchers say in their abstract. "First, students who have the desire and aptitude to become accomplished and productive engineers are abandoning the discipline in startling numbers. Second, students who graduate are frequently not prepared for the realities of their chosen profession and are switching careers at alarming rates."



TOM CHEN

"Students have been taking some courses in isolation; they don't know why they're there and the relevance of what they learn," said Tom Chen, a co-investigator and professor of Electrical and Computer Engineering and Biomedical Engineering. "We need to do a better job of connecting the dots for them."

Three threads, each headed by a faculty member, will run through the new curriculum: Foundations, Creativity, and Professionalism. The new curriculum will also focus more on "soft skills" that engineers need beyond technical expertise, in areas like communication, ethics, social impact and interaction in large, diverse groups.

The NSF awarded a total of $12 million in the 2015 round of its Revolutionizing Engineering Departments initiative, or RED. "RED focuses on transforming department structure and faculty reward systems to stimulate comprehensive change in policies, practices and curricula," said Donna Riley, NSF program director for engineering education research.

Read the full story at http://source.colostate.edu/csu-lands-2-million-nsf-grant-to-revamp-engineering-education/.

SCHOLARSHIP AWARD WINNERS

LAWRENCE RECEIVES JOAN C. KING ENDOWED MEMORIAL SCHOLARSHIP

Katie Lawrence is the first student to be awarded the Joan C. King Endowed Memorial Scholarship for the 2015/16 school year. She is pursuing bachelor's degrees in biomedical engineering and in mechanical engineering. Currently, Lawrence works as an intern for Wolf Robotics and creates 3D visual simulations of cells, helping Wolf customers find creative and innovative solutions.

Katie is a top academic achiever and also a native of Colorado. She enjoys outdoor activities, including hiking, running, biking, walking, and paddle boarding. She is also musically talented. Recently, she began taking violin lessons in addition to playing the piano for five years. Her creative talents keep her busy scrapbooking, making jewelry, and creating scratch art and mosaic tile projects.

The Joan King Memorial Scholarship supports exceptional students with an interest in biomedical science or engineering and with an eye toward sharing their talents with the world in the context of work/life balance. This endowed scholarship will generate a $1,000 annual scholarship.

MIKELSON RECEIVES SBME SCHOLARSHIP FOR LEADERSHIP AND INNOVATION

Hannah Mikelson received the $1,000 SBME Scholarship for the 2015/16 school year. This scholarship was created as a pending endowment to support biomedical engineering students who show a commitment to leadership and excel as creative problem-solvers.

"My goal and dream is to become a biomedical engineer in order to help improve the health and happiness of patients through orthopedics and orthopedic devices. This scholarship will greatly aid me in completing my bachelor's degree in biomedical engineering and mechanical engineering," said Mikelson.

Extremely active in various leadership roles, she serves as the President of the Society of Women Engineers–CSU Chapter and has been the collegiate senator for the Society of Women Engineers–Region I (covering the central region of the U.S.). In addition, she is participating in a co-op at Zimmer Biomet.

NEW SAMSON DESIGN BIOTECHNOLOGY INNOVATION SCHOLARSHIP

Many thanks to SBME Advisory Board member Jeff Samson and his wife, Sharon, of Samson Design Associates Inc. for creating the Samson Design Biotechnology Innovation Scholarship. This annual $2,500 scholarship was created to support a new SBME graduate student who demonstrates an interest and talent in biotechnology innovation and shows promise in innovative thinking.

Yanyi Zang was this year's award winner. Zang is beginning her Doctorate in Philosophy in Bioengineering in fall 2015. As an undergraduate student, she conducted nanotechnology research at Kent State University. "I chose CSU as my graduate school because SBME has collaboration throughout the campus and other industries, which offers me great opportunities to learn more skills," said Zang. She received this scholarship for her independent research and ability to capitalize on an accidental discovery of a potential MRI contrast agent.

PHILANTHROPISTS PROPEL REGENERATIVE MEDICINE

by Coleman Cornelius

Philanthropists John and Leslie Malone, fascinated by the healing power of stem cells, have committed a record $42.5 million to Colorado State University to develop regenerative medical therapies for animals and people. It is the largest cash gift in university history, a remarkable commitment to improved human and animal health and well-being.

The donation will launch the CSU Institute for Biologic Translational Therapies to investigate next-generation remedies based on living cells and their products, including patient-derived stem cells, to treat musculoskeletal disease and other ailments. Colorado State veterinarians are expert at analyzing medical treatments for animal patients, then providing knowledge gained to boost human medical advancements; the progression is known as translational medicine and is successful because of similarities in animal and human physiology and disease.

The Malones focused on the Orthopaedic Research Center's work in biological therapies – with gene therapy, stem cells, specialized tissue replacement and novel proteins. These therapies, used alone and in combination with minimally invasive surgery, could provide more effective and longer-lasting treatment for equine athletes and people with osteoarthritis and orthopaedic injuries.

Colorado State has demonstrated the value of treating animal patients with naturally occurring disease as a vital step in developing new treatments for human patients, noted Dr. Mark Stetter, dean of the CSU College of Veterinary Medicine and Biomedical Sciences.

The approach provides a logical and clinically relevant step in the benchtop-to-bedside research path for new therapeutics: Veterinarians design clinical trials to treat animals with chronic or acute illness; knowledge gained in the course of this treatment helps spark new therapies for pets and people. "We are extremely grateful to Dr. and Mrs. Malone for supporting the unique role of veterinary medicine by so significantly supporting strides in animal medicine that may be translated into new options in human healthcare," Stetter said.

John Malone described his own orthopaedic aches and pains while explaining the vision he and his wife have for advancing regenerative treatments. "This is a very exciting and very broad area of research, and it's going to pay big dividends in both human and animal medicine," Malone said. "It seems entirely appropriate to assist in the development of this research at one of the top vet schools in the country."

Read the full story at http://source.colostate.edu/malone/.

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School of Biomedical Engineering

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SBME Events Calendar

OCTOBER 2015

SBME Seminar: Dr. Paul Campagnola, University of Wisconsin
Oct. 5 / 103 Behavioral Sciences / 12—12:50 p.m.

Homecoming Weekend
Oct. 15-17 / CSU Main Campus

SBME Seminar: Dr. Bob Tranquillo, University of Minnesota
Oct. 19 / 103 Behavioral Sciences / 12—12:50 p.m.

DECEMBER 2015

SBME Seminar: Dr. Nancy Allbritton, University of Northern Colorado
Dec. 7 / 103 Behavioral Sciences / 12—12:50 p.m.

Front Range Neuroscience Group Annual Meeting
Dec. 9 / Hilton Fort Collins / 10:00 a.m.—6:30 p.m.
For information, visit http://FRNG.colostate.edu

giving opportunities >>>

Scholarships

Scholarships at all levels provide critical aid to our students. We strive to help as many students as possible with the financial obligations of their engineering education. The undergraduate five-year degree program makes it particularly challenging for students to afford the education they need to make a difference in this world.

Donate to an SBME scholarship today and know that your gift will make an impact for years to come.

SBME Scholarship for Leadership and Innovation
https://advancing.colostate.edu/SBME

Joan King Scholarship
https://advancing.colostate.edu/KingScholarship