Volume 1, Issue 2 Fall 2013

Colorado State University
SCHOOL OF BIOMEDICAL ENGINEERING

Special points of interest:

- New Dean of Engineering Hits the Ground Running
- BME graduate students showcase research on liver tissue engineering at BMES Conference
- SBME launches beta test of CSU crowdfunding platform, *Charge*

Inside this issue:

Message from the Director

Dr. Stuart Tobet, director

The School of Biomedical Engineering is proud to play a significant role in the piloting of community-based fundraising projects via Colorado State University's new crowdfunding platform, *Charge*. CSU is the first university in the state to open a web-based crowdfunding platform to potential donors.

Our number one goal with this platform is to bring together the community of people interested in following advances in biomedical engineering at CSU. We will be continuously updating project information including how donations are helping move initiatives and programs forward.

Our focus with this platform is to stay connected to our supporters and engage a community that grows and shares information. Your financial support will provide critical opportunities for the program, its trainees, and the community to thrive together. This is a grass-roots effort looking for low levels of support from greater numbers of people. Donors can choose their favorite causes and support them for as little as $10.

The three initial pilot projects are for the community-based Muscles Alive! program, a Scholarship for Leadership and Innovation in Biomedical Engineering, and a Meeting Travel Fund to support SBME trainees promoting CSU research to the world at large. In this issue, you will find detailed descriptions of our projects. I hope they will inspire you to contribute and spread the word about the biomedical engineering students, research, and outreach at Colorado State.

If you would like more information, feel free to reach out to me directly at (970) 491-7157 or Stuart.Tobet@colostate.edu.

Dean McLean Hits the Ground Running

David McLean began his role as Dean of the College of Engineering at Colorado State University on July 1. Since that time, he has been working with the college's leadership to advance the activities and improve the reputation of the college. McLean has initiated a strategic planning process to help set priorities across the college which will support our signature research areas, enable strategic enrollment growth, improve operational efficiencies, and create performance-based budgeting. In addition, McLean has embarked on an ambitious goal—100 visits with the college's stakeholders in 100 days. He has also met with a number of external advisory boards (including Biomedical Engineering) and student groups to not only share his vision and initial plans, but also to listen.

"One of the more interesting things I learned was how closely COE's strengths and activities align with the State of Colorado's 'Key Industry Sectors'—Bioscience, Energy and Natural Resources, Infrastructure Engineering, Aerospace, Electronics, and Transportation and Logistics," said McLean.

Graduate BME Studies Update

Enrollments are up for fall 2014 with significant growth in the online Master of Engineering degree program. As funding for research projects becomes increasingly more difficult for faculty across the country, our faculty are rising to the challenge by submitting ever more proposals. We are also partnering with neighboring medical institutions to make sure that our research efforts target unmet medical needs. As we meet success, we intend to increase our Ph.D. student enrollment numbers.

To increase outreach and visibility, SBME and CSU's OnlinePlus hosted a webinar (http://bit.ly/1841Ghb) earlier this semester to discuss the online Master of Engineering program. Dr. Ketul Popat, assistant professor, Mechanical Engineering and SBME; Stuart Tobet, director, SBME; Sara Neys, graduate advisor, SBME; and Alysson Miller, current graduate student in the program, discussed curriculum, the application process, and what to expect as a student in the program. It was an interactive event that brought together prospective students from all over the country.

One of the most exciting events this semester was our move to the new Suzanne and Walter Scott, Jr. Bioengineering Building. In mid-October we boxed up the old space and traveled across two parking lots. We are now located on the first floor in the Engineering Success Center. Many of our College of Engineering faculty and their research labs moved over the summer and earlier this fall. We are enjoying our new space in this state-of-the-art facility and would be happy to take you on a guided tour.

For more information regarding SBME graduate programs or to schedule a tour of the Scott Bioengineering Building, please contact Graduate Advisor Sara Neys at (970) 491-7157 or Sara.Neys@colostate.edu.

Sara Neys, advisor, SBME Graduate Programs

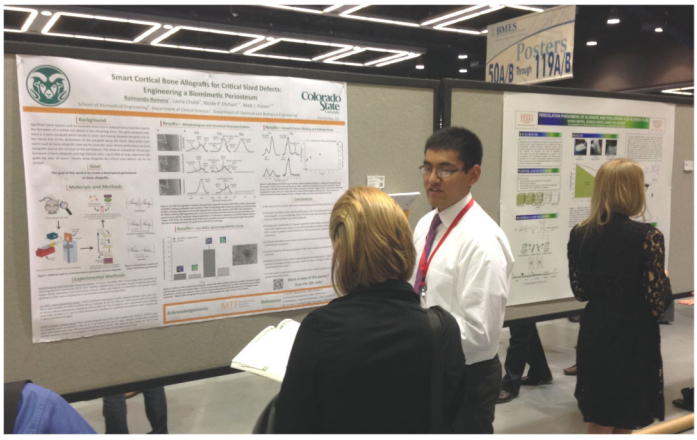
Students Showcase Research at BMES Conference

Four bioengineering graduate students (Dustin Berger, Matthew Davidson, Christine Lin, and Brent Ware) from Colorado State University presented their research on liver tissue engineering at the 2013 Biomedical Engineering Society (BMES) Conference in September.

The conference was held in Seattle, Washington and attended by thousands of leaders from around the globe in the field of biomedical engineering including academics, industry, and health care.

"It was very humbling to be surrounded by many bright and talented individuals, applying knowledge, creativity, and engineering principles towards bettering our understanding of the intricate biological world we live in," said Dustin Berger, Ph.D. candidate.

"Many of the talks focused on the role substrate elasticity plays in cellular phenotypes. Dr. Adam Engler's presentation highlighted how a cell's activation state can be modulated by the stiffness of the materials which they grow on. I am now investigating the role substrate stiffness plays in liver tissue engineering."



Invited to participate on a pre-conference (Biomedical Engineering-Innovation, Design and Entrepreneurship Alliance) faculty panel presentation, Stuart Tobet, director of the School of Biomedical Engineering at CSU, highlighted how the CSU SBME program leverages regional strengths.

Presentations from the BMES Conference can be viewed at: http://www.stanford.edu/group/biodesign/cgi-bin/bme-idea/meetings-2/913-seattle/.

Undergraduate BME Studies Update

With burgeoning numbers, extremely bright and dedicated students, and a growing job market, the SBME undergraduate dual degree program continues its rapid growth, begins upper division courses, and prepares for senior design for its first graduates.

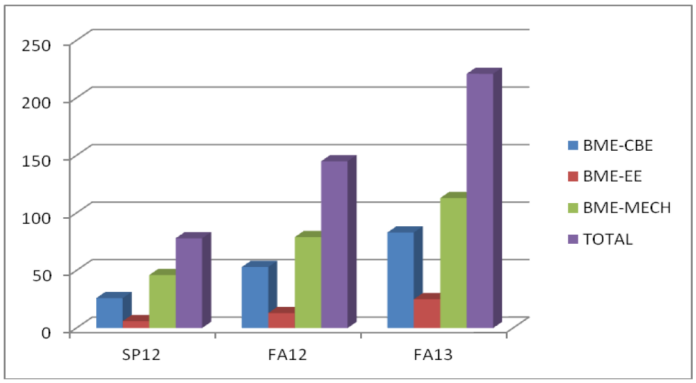
This fall our incoming freshman class size rose again to almost 100 students. Each of the three dual-degree programs, in partnership with the Electrical & Computer Engineering, Chemical & Biological Engineering and Mechanical Engineering departments, had healthy growth as seen in the chart below.

The caliber of students attracted to our rigorous program remains amazing. A third of BME undergraduates are participating in the honors program; 30 students have chosen to work in campus research laboratories (an option available to all of our students), and despite the smaller initial cohorts, over 20 students had internships this past summer, including industry positions in and out of Colorado with local opportunities provided by Allosource, Covidien, Medtronic, and Terumo. Please remember to visit SBME's crowdfunding page (http://engr.colostate.edu/sbme/charge) and contribute to the scholarship fund in support of our fantastic students.

This is also an exciting year as our maturing program offers upper division courses for the first time, including our BIOM 300 laboratory course taught in the new Lisa and Desi Rhoden Biomedical Engineering and Teaching Laboratory in Spring of 2014, and gateway courses in each of the partner majors. Our students will also begin taking biomedical engineering technical electives over the next year. And of course, as our first cohort of students head toward graduation in Spring 2015, they will be participating in a capstone experience, senior design projects, beginning in Fall 2014.

BME senior design projects will be unique in that they will meet the ABET requirements for both BME and the students' partner majors. These interdisciplinary team projects allow students to solve an engineering problem by designing and building solutions. The hands-on, real-world applications of these projects give students great experience and a competitive advantage in their next professional steps. We particularly want to reach out to our industry collaborators for project ideas, and even project advisors, in support of senior design.

If you or your company would be interested in partnering with us for internships, scholarships, company tours, senior design projects or other activities, please contact Undergraduate Advisor Brett Eppich Beal at (970) 491-7077 or Brett.Beal@colostate.edu.

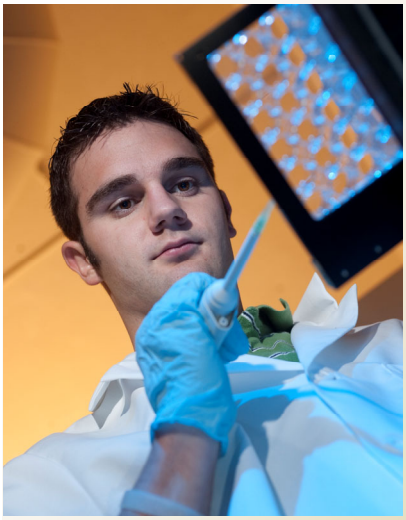


Kevin Lear, director, SBME Undergraduate Programs and Brett Eppich Beal, undergraduate advisor

BME Entering Class of Fall 2013 at Ram Welcome/Orientation

SBME Launches Beta Test of CSU Crowdfunding Platform

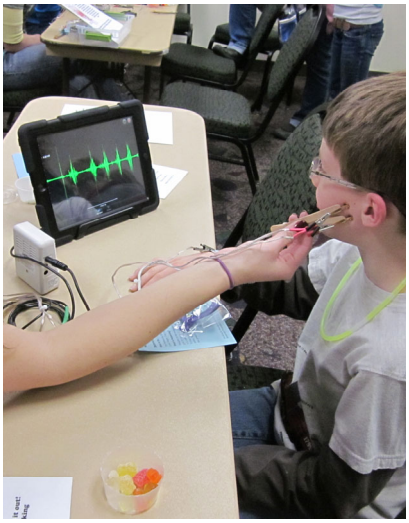
SCHOOL OF BIOMEDICAL ENGINEERING SCHOLARSHIP FOR LEADERSHIP AND INNOVATION



This scholarship was created to support graduate and undergraduate students pursuing careers in biomedical engineering. Through the creation of this pending endowment, SBME hopes to raise $25,000, so that it may provide an annual $1,000 scholarship in perpetuity. This type of fund allows for annual expendable gifts while the endowment is growing. These funds will provide for students to enroll and attend when financial issues might make it impossible. It also will help promote the participation of students in laboratory experiences from the early stages of their educations.

To contribute to this fund, visit: www.engr.colostate.edu/sbme/charge.

MUSCLES ALIVE!



Muscles Alive! is a public outreach program which aims to bring the concepts of brain and nerve function into K-12 classrooms throughout Northern Colorado. Brian Tracy, a professor in the Department of Health and Exercise Science in the College of Health and Human Sciences and a member of the SBME faculty, uses kid-friendly Popsicle stick electrodes, iPads, and novel inexpensive electronics to create Muscles Alive!, which allows kids to see, hear, and experience their own muscle electrical activity and learn about how their body works. The goal is to raise $10,000 for equipment, educational materials, and a part-time program coordinator.

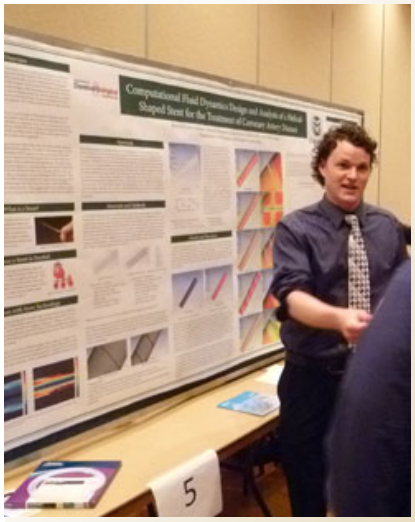
To contribute to this fund, visit: www.engr.colostate.edu/sbme/charge.

"We selected these projects to be part of our pilot program because they represent the breadth of efforts for students, research, and outreach" said Stu Tobet, director of the School of Biomedical Engineering, which includes faculty from CSU's colleges of Engineering, Veterinary Medicine and Biomedical Sciences, Natural Sciences, and Health and Human Sciences. "We will engage multiple innovative approaches to reach members of the community who are interested in our work as well as those who may want to learn more about the incredible advances our faculty are making."

After analysis of the SBME beta test, the ultimate goal is to be able to roll out the *Charge* crowdfunding platform to other colleges, departments, and units across campus. *Charge* is administered through CSU's annual giving office. **"This crowdfunding initiative shows, once again, that Colorado State is on the cutting edge of innovation,"** said Brett Anderson, vice president for University Advancement at CSU. "We are now offering our donors another avenue to provide support directly to the colleges, programs, and specific projects at the University that are most meaningful to them."

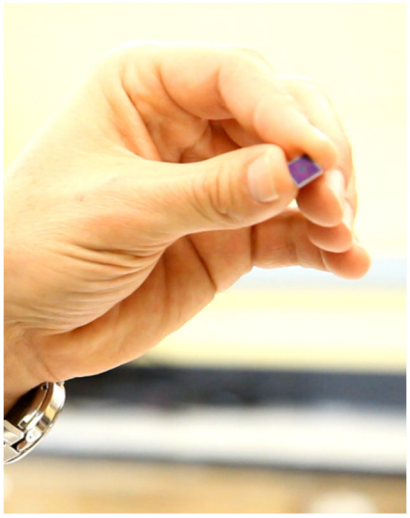
CSU has partnered with Community Funded LLC and its "Empowered By" product to create the *Charge* platform. **To see the projects currently available for funding through *Charge*, visit www.engr.colostate.edu/sbme/charge.**

BIOMEDICAL ENGINEERING AMBASSADORS PROGRAM - COMING SOON!



The BME Ambassadors Program was created to increase awareness and visibility of the unique research projects taking place at CSU with a focus on improving health, fighting disease, and aiding persons with disabilities. It is made up of six Colorado State graduate students who will be trained to speak and present the latest biomedical/bioengineering research and innovations happening at CSU. Each year, the ambassadors will visit six to eight high schools, community colleges, professional associations, foundations, or nonprofit organizations located along the Front Range to provide lectures or demonstrations. The Ambassadors Program will also allow our students to gain valuable communication skills as they explain research to people in diverse walks of life.

CHEMICAL VISION! ELECTROCHEMICAL BIOSENSOR - COMING SOON!



The electrochemical biosensor is a device providing diagnostic tools and research data that will help obtain information needed to find cures for disease such as infertility, kidney failure in the elderly, epileptic seizures, and cancer, to name a few.

The electrochemical chip designed by electrical and biomedical engineering students at CSU will collect data from over 8000 electrodes in 3 square millimeters. For the microscopic world of biology, this provides an unprecedented view of cellular communication and interaction. This ability could help lead to novel diagnostic capacities.

Your support will help us purchase equipment and a computer to crunch large amounts of data and continue educating trainees who will be enabled to contribute to medical breakthroughs.

POWER OUR COMMUNITY OF FUNDERS by participating in two easy ways:

1. **Contribute.** For as little as $10 you can support these initiatives at www.engr.colostate.edu/sbme/charge.
2. **Promote.** Share these projects on Facebook and Twitter.

SBME Staff and Student Achievements

SBME STUDENT RECEIVES FIRST PLACE FOR SCIENTIFIC MERIT AT ASME CONFERENCE

Ben Gadomski, SBME Ph.D. student, presented in the Orthopaedics, Musculoskeletal, and Injury Mechanics category at the American Society of Mechanical Engineers 2013 Summer Bioengineering Conference in June.

This year's conference theme was Translational Research. Out of 180 students who submitted abstracts, only 36 were chosen to present their work at this year's conference which was held in Sunriver, Oregon.

Gadomski took first place for scientific merit and presentation of his work titled, "Simulated Microgravity in a Large Animal Model." Gadomski works in the Orthopaedic Bioengineering Research Laboratory with Christian Puttlitz, associate professor in the Department of Mechanical Engineering and Biomedical Engineering.

DAN GUSTAFSON RECEIVES SHIPLEY UNIVERSITY CHAIR

Highly respected clinical scientist, Daniel Gustafson, was named to the Shipley University Chair in Comparative Oncology for his groundbreaking research in pharmacology, which is helping cancer doctors determine better treatments for their patients.

"The focus of my research has always been to gain a better understanding of why drugs work in some patients and not in others, and how we can improve on that," said Gustafson, a professor of cancer pharmacology, director of research for the Flint Animal Cancer Center, and director of the University of Colorado Cancer Center Pharmacology Core, which is housed by Gustafson's laboratory at Colorado State.

Gustafson's research is highly aligned with comparative and translational cancer research and has broad application across all disciplines in oncology as well as for all species.

SBME CORE FACULTY RECEIVE KUDOS FOR PATENTS

At the College of Engineering All College Meeting and Awards in October, biomedical engineering core faculty, Susan James, Kevin Lear, and Kenneth Reardon, received plaques for having recently received U.S. issued patents.

Sue James: **U.S. Patent 8,133,168** Remediation of Functional Cardiac Mitral Valve Regurgitation; **U.S. Patent 8,524,884** Outer Layer Material having Entanglement of Hydrophobic Polymer Host blended with a Maleated Hydrophobic Polymer co-Host, and Hydrophilic Polymer Guest; and **U.S. Patent 8,524,886** Outer Layer Having Entanglement of Hydrophobic Polymer Host and Hydrophilic Polymer Guest. Kevin Lear: **U.S. Patent 8,349,605** Optical Analyte Sensor and **U.S. Patent 8,455,844** System and Method for Time-Division Multiplexed Optical Sensing of Biosensors. Kenneth Reardon: **U.S. Patent 8,323,956** Distal Tip of Biosensor Transducer Comprising Enzyme for Deamination.

SBME faculty disclosed more than 80 new technologies to CSU Ventures between 2010 and 2013, accounting for nearly 20 percent of technologies disclosed, university-wide.

RAY BROWNING'S MULTI-SENSOR INSOLES COMMUNICATE WIRELESSLY

Ray Browning, an assistant professor in the Department of Health and Exercise Science and Biomedical Engineering, and his colleagues are working on a prototype developed by SmartMove, a local start-up company, for an accelerometer/pressure sensor worn in the shoe.

The SmartMove device is an insole with two very thin pressure sensors built into it, combined with an accelerometer, so there are multiple sensors on the foot that can communicate wirelessly with a smartphone. The device can "estimate what you're doing, such as walking, sitting, standing, riding a bicycle, or walking up stairs," Browning said. "By being able to classify the activity, we are better able to estimate the energy expenditure."

Browning's research confirms people's hypothesis that accelerometers that claim to be able to measure all of your physical activity with one sensor on one part of your body are generally not very accurate, though the area of physical activity monitoring in general is a rapidly evolving area, as is evidenced by Browning and his team's own invention.

Regulatory Affairs Program Update

In September, Deanna Scott, director of the Interdisciplinary Regulatory Affairs Program, attended the Regulatory Affairs Professional Society (RAPS) annual meeting in Boston. Prior to the conference, Scott participated in the first formal meeting of the Academic Graduate Regulatory Educators Group (AGRE). The mission of this group is to create a regulatory graduate core knowledge skill standard, to publish these standards in peer reviewed literature, and eventually form an accreditation process for graduate regulatory programs.

In an effort to delineate the differences and streamline the opportunities between training and formal regulatory education, the group decided that forming a partnership with RAPS was essential. Discussions concerning the formation of a RAPS/AGRE partnership have begun. Mr. Rainer Volksen, the president-elect of RAPS, noted that the two organizations have similar but distinct purposes and should be partners. He indicated the purpose of AGRE and the Universities is to teach the fundamentals of regulatory science and practice to students and budding regulatory affairs professionals.

The School of Biomedical Engineering at CSU is pleased to participate in the development of the graduate skills sets in Regulatory Affairs, and will keep you apprised of this new group and its potential impact on the regulatory field.

The 32 universities participating in AGRE identified five key concept areas of focus for the standard skills – regulation, quality, clinical, communication and strategy. Students should have an in-depth understanding of the following concepts upon completion of a two year master's degree in regulatory affairs:

Regulations – Obtain and apply broad knowledge of domestic and international law, regulations, and guidance documents covering pre- and post-market requirements for at least one category of medical products, including combination products.

Quality –Examine quality systems and standards and their impact on product and public safety as well as the importance of quality products from the perspective of health care providers.

Clinical – Obtain and apply broad knowledge of FDA and international requirements for the approval and conduct of pre- and post-market clinical studies with regulated products. Understand the basic principles of clinical study design and clinical data analysis.

Communication - Develop interpersonal, critical thinking, and interpretation skills. Develop written and oral communication skills, with the scope and flexibility to address audiences with differing size, knowledge, and priorities. Write/present clearly and concisely in an audience-appropriate manner.

Strategy - Recognize the factors that influence domestic and international regulatory decisions. Develop methods to incorporate regulatory trends and practices. Think strategically about product development, market approvals and marketing.

These areas were further broken down to specific curricular outcomes, which will be integrated into the CSU graduate regulatory affairs courses as they are developed.

For more information about the Regulatory Affairs program contact Deanna Scott, director of the Interdisciplinary Regulatory Affairs Program, (970) 402-5330 or Deanna.Scott@colostate.edu.

Deanna Scott, director, Interdisciplinary Regulatory Affairs Program

SBME Continues to Collaborate with UCHealth

SBME faculty continue to collaborate with physicians at the University of Colorado Health Research Institute. Drs. Gary Luckasen and Julie Dunn lead the efforts at UCHealth. To formalize the partnership, Medical Center of the Rockies and Colorado State University are creating a formal memorandum of understanding that will provide a framework and recipes for promoting successful collaborations. There have been $10 million dollars in grant proposals submitted in the context of this growing partnership. Information about individual research projects will be made available as funding awards are announced.

Colorado State University
SCHOOL OF BIOMEDICAL ENGINEERING

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FIND US ON:

SBME Events Calendar

NOVEMBER 2013

SBME Seminar: "Professional Development for Scientists: Communication and Marketing" presented by Drs. Stuart Tobet and Christina Sutton, CSU
Nov. 18 / CSU Behavioral Sciences Bldg., RM 103 / 12—12:50 p.m.

DECEMBER 2013

SBME Seminar: "Using Proteomic Approaches to Assess the Cardiomyocyte Effects of Soy Phytoestrogens" presented by Drs. Karyn Hamilton and Ken Reardon, CSU
Dec. 2 / CSU Behavioral Sciences Bldg., RM 103 / 12—12:50 p.m.

Front Range Neuroscience Group Annual Meeting
Dec. 4 / Hilton Fort Collins / 10:00 a.m.—6:30 p.m.; For information or to register, contact Stuart.Tobet@colostate.edu or visit http://FRNG.colostate.edu

SBME Seminar: "Microfluidic Encapsulation for the Design of Intra- and Extracellular Niches" presented by Dr. John Oakey, University of Wyoming
Dec. 9 / CSU Behavioral Sciences Bldg., RM 103 / 12—12:50 p.m.

APRIL 2014

Engineering Days
April 25 / Suzanne and Walter Scott, Jr. Bioengineering Building

BME Alumni Class Notes

Your former classmates are eager to hear from you! Keep them informed of your career accomplishments and personal achievements through the Class Notes section. In future editions of the SBME newsletter, we will be publishing life updates of BME alumni. Updates can include a new job, promotion, award, patent, further education, volunteer work, marriage, birth, or any accomplishment that you would be proud to share. If you are open to others connecting with you, please provide your email address and ask that it be published along with your news.

Please send your updates and photographs to Allison.Robin@colostate.edu. If you chose to send an electronic image, be sure it is a high resolution photo of at least 300 dpi. We look forward to hearing from you!