

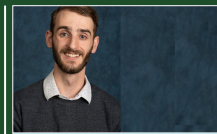


**SCHOOL OF BIOMEDICAL
ENGINEERING**
COLORADO STATE UNIVERSITY



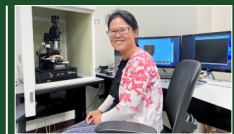
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Volume 11, Issue 2 Fall 2023

MESSAGE FROM THE DIRECTOR

Propelling the School Forward

In the Spring 2023 newsletter, there was anticipation for a new Dean for the Walter Scott Jr. College of Engineering, and the addition of new staff members in the [School of Biomedical Engineering](#). The Fall Semester of 2023 ended with several positive notes for the future. Dr. Allen Robinson joined the college as Dean this summer (see story later in this newsletter). Marianne LaCount joined us to help with communications and office managing while Chase Jackson has been advising undergraduate students along with the student chapter.

In October, the [CSU Biomedical Engineering Society \(BMES\)](#) chapter students were presented the Outstanding Chapter Industry Program Award at the Fall 2023 National BMES Conference in Seattle, WA for their work on a unique project to enable driving for a student without arms (their CASE project) along with other outreach programming.

In November, the CSU BMES student chapter also initiated a biomedical industry-focused career fair, that they named “BioInnovate” in response to the need for more student-industry recruitment. A number of BMES students worked tirelessly to make the event successful and in the process created something that should live on through future fall semesters.

In addition to the success of the BMES student chapter, SBME Graduate Student, Kyler Howard, was awarded a Fall 2023 WSCOE Excellence in Research Award for his research in Electrical Impedance Tomography (EIT) that could create faster, more high-quality imaging in infants.

If you want to regularly follow the exciting research in SBME, our Monday seminar series is open to all—in person or online. SBME faculty and off-campus speakers are invited to present their research along with progressing graduate students. In the fall, four graduate students presented their research in the Seminar series. Stay tuned for more in the spring. For students, this serves an invaluable experience that prepares them for thesis presentations and for their careers after graduation.

Change is the essence of progress and innovation. Even though change is inevitable, it can also be bittersweet as longtime faculty and friends move on to new phases of their careers. In December, SBME Associate Director, Undergraduate Program Director, Core SBME Faculty, and Mechanical Engineering Professor, Dr. Ketul Popat began a transition to a new appointment as a Department Head for Biomedical Engineering at George Mason University in Virginia that officially starts in 2024. We wholeheartedly congratulate him on this new phase and look forward to future collaborations on a national level. Dr. Popat’s contributions to SBME have been invaluable and his contributions will live on through his impactful decisions.

With Dr. Popat’s departure, we welcome Dr. Samuel Bechara, [Mechanical Engineering](#) professor and Core Faculty of SBME, as the Interim Undergraduate Director. Dr. Bechara knows the program well as he was one of the first graduates of the PhD program and has been a recent instructor for key courses in the undergraduate curriculum. A search for a regular SBME undergraduate director will be carried out this spring.

SBME students do amazing things supported by a strong staff and caring faculty. We look forward to a new year of student success, exciting research, and new findings in the world of biomedical engineering.

We are incredibly excited about the upcoming semester and the possibilities that SBME members continue to bring to the table, at all levels.

Dr. Stuart Tobet
Director, SBME

Colorado State University BMES Student Chapter Involvement: Fall 2023

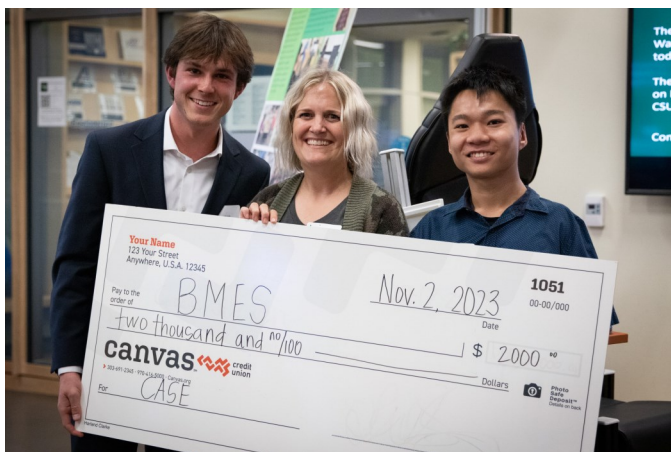
By Marianne LaCount

It is no secret that the [Biomedical Engineering Society \(BMES\) CSU student chapter](#) is comprised of dedicated and ambitious students, but their achievements in Fall 2023 have set the bar high for future BMES Officers and created excitement to join the student organization amongst other students.

On November 2nd, 2023, the [Colorado State University](#) student chapter of the Biomedical Engineering Society (BMES), put on BioInnovate, a career expo directed toward biomedical engineering students interested in the biomedical industry. Companies in attendance included 3D Systems, The Gait Lab at Children's Hospital Colorado, Hyde Engineering and Consulting, Medtronic, Orthopaedic Bioengineering Research Laboratory, Tensentric, Terumo, and UC Health.

Over 100 students from across the university attended, including students from the School of Biomedical Engineering at the Undergraduate and Graduate level, students in other programs in the [College of Engineering](#), and the [Department of Biomedical Sciences](#) in the [College of Veterinary Medicine & Biomedical Sciences](#).

Eric Gutierrez-Camacho, Industry Director of the CSU student chapter of BMES said, "The Biomedical Engineering Society student chapter at CSU created BioInnovate to establish a platform for BME students and biomedical engineering companies to connect, network, and share job opportunities. This would allow students to get internships and gather experience more related to their major."



Ian Lohrish (left), Fall 2023 President of the CSU Student Chapter, accepts check from Kim Barlow (middle), Canvas Credit Union Branch Leader, for the CASE Project with Jian Cohen, inspiration behind CASE (right)



Raylee Senn, BMES Outreach Coordinator (right), talks with UC Health representative (left) at BioInnovate

[Canvas Credit Union](#) presented the CSU student chapter of BMES with a \$2k dollar check to support the [CASE project](#), a mechanical foot-steering system for [CSU Computer Information Systems](#) student, Jian Cohen, who was born with no arms.

The student chapter achievements over the past year, including the CASE project and their well-known outreach program, landed CSU BMES students at the Fall 2023 [National BMES](#) Conference in Seattle where they were awarded with the *Outstanding Chapter Industry Program Award*. At the conference, Ian Lohrish, BME + Mechanical Engineering student and BMES student chapter president, gave a presentation on the CASE project and Eric Gutierrez-Camacho, Industry Director of the CSU BMES student chapter, served on a panel at the conference called "Making Your Chapter Thrive".

"This years' group of BMES students is really remarkable," Dr. Stuart Tobet, Director of the School of Biomedical Engineering said. "In my 14 years at SBME, I have never seen a more determined and coordinated group of talented young professionals."

Visit the [BMES CSU student chapter website](#) to learn more about the work they are doing in Industry, Outreach, and CASE and to become a part of this spectacular group!

SBME Industry Advisory Board: Getting Involved with Biomedical Engineering Students

By Marianne LaCount

Every semester, the School of Biomedical Engineering meets with our Industry Advisory Board (IAB), comprised of faculty, CSU Alum, and Industry Partners to discuss the program and ways to create more student engagement and a path to growth for the program. Each IAB member shares valuable knowledge regarding hiring for industry, thoughts on experiential learning opportunities for SBME students, and other topics such as funding the experiential learning programs implemented by SBME.



Larry Blankenship, IAB Member and Medical Device Industry Professional and Consultant (left) and BME student (right) chatting at the Ask an Expert table at BioInnovate

During the Fall 2023 IAB meeting, a common thread of discussion is that the best way to grow the program is by interacting with the students and asking what is important to them and where they feel improvements can be made. The School of Biomedical Engineering always makes a point to schedule the Fall and Spring meetings around events that are important to the students to give our IAB members the opportunity to attend and visit with the students.

This year, we scheduled our Fall meeting for the day after BioInnovate, a biomedical industry-focused career fair created and put on by the CSU BMES student chapter, whom graciously created a booth called “Ask an Expert”, where our IAB members were able to offer career advice to students. The idea was to make BioInnovate as much of an educational opportunity as an amazing networking opportunity for BME students.

While the SBME IAB members were here, they visited the Senior Design class and served on a panel discussion where students could ask what the IAB members, who will be judging the spring 2024 E-Days on April 19th, will be looking for in their projects, along with advice on where to start when it comes to coming up with and creating a medical device.

A common theme the IAB members talked about was the importance of creating a medical device to solve a problem and not creating a problem to fit the medical device.

The IAB members also talked about how important it is to be specific with your questions to medical professionals to make sure the device will satisfy their needs and not create further hinderances.

Having a group of involved IAB members helps us continue to grow and better the BME program. Thank you to all of our IAB members for helping make the BME program what it is today!



IAB members from left to right: Larry Blankenship, Jeff Samson, Dennis Brunner, Stephanie Salazar, and Ray Goodrich, talking to the Senior Design students about past failures in their careers that helped them grow.

Farewell to SBME Undergraduate Director, Dr. Ketul Popat

by Marianne LaCount

It is with a heavy heart that we bid a farewell to the SBME Undergraduate Director, Core Faculty of SBME, and Mechanical Engineering Professor at Colorado State University, Dr. Ketul Popat. Dr. Popat's contributions to the School of Biomedical Engineering are insurmountable, and he will be missed dearly.

Dr. Popat has been the SBME Undergraduate Director since 2019 and SBME Core Faculty, and a Mechanical Engineering Professor for years. Dr. Popat's face is often SBME student's first introduction to biomedical engineering, as he has taught BIOM 100, Overview of Biomedical Engineering since joining the SBME team.

During his tenure, Dr. Popat has made invaluable contributions to our school, leaving an indelible mark on our academic programs and the lives of our students. His passion for education, dedication to fostering a vibrant learning environment, and commitment to the growth of our undergraduate program have been commendable. We extend our heartfelt gratitude to Dr. Popat for his tireless efforts and wish him the very best in his future endeavors.

Dr. Popat said, "I would like to thank everyone that has made my time here at CSU unforgettable, including Stu Tobet, Sue James, Matt Kipper, Melissa Reynolds, Zhijie Wang, and many others. I would also like to thank my students and the SBME team that have been such a pleasure to work with."

As Dr. Popat leaves, Dr. Sam Bechara, Mechanical Engineering, SBME Core faculty and SBME alumni, will be joining us as the Interim Undergraduate Director for the School of Biomedical Engineering. Dr. Popat will be the new Department Chair of the Bioengineering Department at George Mason University in Virginia.

Thank you Dr. Popat for all you have done for the School of Biomedical Engineering and the Mechanical Engineering Department!



WELCOMING THE NEW DEAN FOR THE COLLEGE OF ENGINEERING, ALLEN ROBINSON

The Walter Scott Jr. College of Engineering welcomed a new Dean just before the Fall 2023 Semester, Allen Robinson who comes to us from a 25-year long career as a mechanical engineering faculty member at Carnegie Mellon University (CMU).

Before his time at CMU, Robinson had a joint appointment in Atmospheric Science and Mechanical Engineering at Colorado State University from 2012 to 2013. Robinson is motivated by the environment and sustainability, which he hopes to take further in this next chapter at CSU.

Full story: <https://col.st/Kge4K>



WSCOE EXCELLENCE IN RESEARCH AWARD - KYLER HOWARD

The School of Biomedical Engineering is proud to highlight SBME Grad student, Kyler Howard who has been awarded the WSCOE Excellence in Research Award.

Kyler's research is about Electrical Impedance Tomography (EIT) which is a low resolution and non-invasive imaging and is commonly used for thoracic imaging and CT imaging in newborns. Kyler has been working on taking the data set used in EIT and modifying it to conduct predictions that would yield in faster, more accurate, and higher resolution imaging.

Congrats on this huge achievement, Kyler!



BME Faculty News: Highlights

by Marianne LaCount

Grass vs. turf: NFL's Achilles and ACL Injuries Happen on Both Surfaces, CSU Researcher Says

By Mark Gokavi

Achilles tendon or anterior cruciate ligament tears are going to happen in the National Football League whether players are on natural grass or artificial turf, but a Colorado State University researcher says playing surfaces can be better.

During the Fall 2023 Semester, Dr. Raoul Reiser, Associate Professor in the Department of Health & Exercise Science and Core Faculty of SBME presented his research on Artificial Turf, where he discussed the impact on athletes and what goes into creating artificial turf that can limit injury on the field. Visit the [CSU website](#) to read the full article.



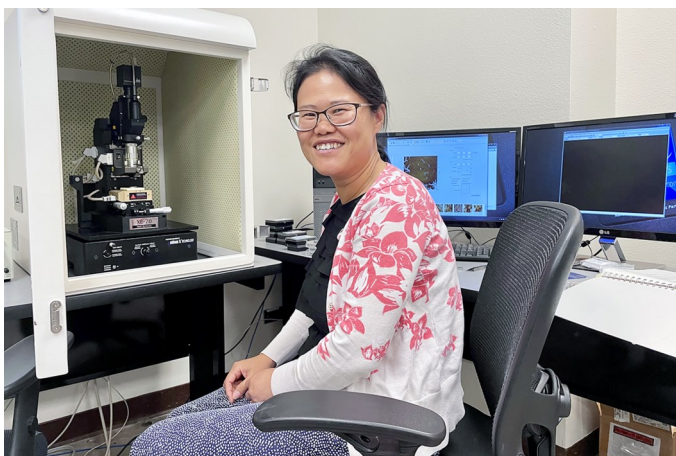
Dr. Raoul Reiser works with students in the Health and Exercise Research labs; Photo Credit: CSU Staff Photographer

CSU Researcher Turning Hemp Crop Residue Into Cellulose Nanocrystals for Biomed Use

By Mark Gokavi

Hemp is already grown for clothing and textiles, construction materials, food products, paper and many other products. Li is working to use the (stems and leaves) left in the field after harvest and convert it into cellulose nanocrystals, which can be used to strengthen many products including biomedical materials.

Yan Vivian Li was among 3 professors that received 2023 grants awarded by [Colorado's Advanced Industries](#). Dr. Li's project focuses on turning Hemp crop residue into reusable material. Visit the [CSU website](#) to read the full article.



Dr. Vivian Yan Li working in her lab; Photo Credit: CSU Staff Photographer

MECH 202 Students, In Nautical Knockdown, Make Their Professor Proud

By Taryn Bradley

"Engineering curriculum can be very regimented, I used to call it the calculus death march," Bechara said with a laugh. "You take Calc I, you take Calc II, you take Physics I, you take Physics II, you take Chem I, you take Chem II, you know what I mean? We have all of these classes that are important foundations for the students, but MECH 202 is one of the first opportunities to just make something, which is what engineers do."

Over the course of the fall semester, more than 20 teams of mechanical engineering students conceptualized, designed, and constructed boats capable of 1) comfortably seating two competition-regulated dolls and 2) sinking or gaining control of their opponent's vessel. Visit the [CSU website](#) to read the full article.



Dr. Sam Bechara running the event; Photo Credit: School of Biomedical Engineering Photographer

The Company We Keep

by Marianne LaCount

Graduate Seminar Summary: Dr. Keith Neeves, CU Boulder

By Marianne LaCount

Dr. Keith Neeves is a Biophysical Mechanisms Researcher and Professor in the Department of Bioengineering and Department of Pediatrics at CU Denver Anschutz Medical Campus and his research interests focus on biophysical mechanisms that regulate hemostasis, thrombosis, and fibrinolysis.

Dr. Keith Neeves presented a method for ablating blood clots using magnetically-powered microbots. These bots consist of micrometer sized superparamagnetic beads that can be injected intravenously and then assembled in situ using external magnetic fields to form wheel-like objects that target occlusion sites. These bots are called microwheels and they can roll on surfaces at velocities greater than 200 $\mu\text{m}/\text{sec}$, which is greater to the fastest microorganisms.

The microwheels move in swarms, which can be manipulated with magnetic field to climb walls and burrow into clots. We have functionalized microwheels with thrombolytic drugs and shown that they can lyse clot 40-fold faster than the drugs alone in vitro. We have used thrombolytic microwheels to ablate clots in zebrafish and murine models of thrombosis demonstrating their use in vivo.



Dr. Keith Neeves

Graduate Seminar Summary: Dr. Roberta Maia Sabino, University of Wyoming

By Marianne LaCount

Dr. Roberta Maia Sabino is an Assistant Professor in Chemical & Biomedical Engineering at the University of Wyoming and was a postdoctoral associate at the Harvard-MIT Biomedical Engineering Center at Massachusetts Institute of Technology, where she worked on the development of a platform for biomaterials to sense the tissue response to implants.

Dr. Roberta Maia Sabino presented on the development of multi-functional materials for biomedical applications to address the ongoing challenge of designing biomedical materials in vitro that will exhibit optimal in vivo performance. The complex chemical, mechanical, and biological environment inside the body is highly variable based on the site of implantation, disease states, and the dynamic cellular milieu following implantation.

Current research is confronting some of the greatest obstacles related to biomedical implant failure, namely the risks of inflammation, blood clotting, infection, or poor integration into the bone. To address this shortfall, Dr. Maia Sabino and her colleagues developed novel biomaterial surfaces with improved biological responses for cardiovascular and orthopedic applications.



Dr. Roberta Maia Sabino

Each semester, the School of Biomedical Engineering invites distinguished guests from around the world and CSU faculty to speak on biomedical engineering research and related disciplines for its weekly seminar series. In addition to off-campus speakers, the School of Biomedical Engineering encourages Masters and Ph.D. students to present their research in preparation for their upcoming defense. The Fall 2023 student speakers included:

M.S. IN BIOENGINEERING, COLORADO STATE UNIVERSITY

Ryan Roessler

Anomalous Diffusion of RNA in the Cytoplasm of HeLa Cells

PH.D. STUDENT IN THE SCHOOL OF BIOMEDICAL ENGINEERING, COLORADO STATE UNIVERSITY

Somayeh Baghersad

*Surface Modification of Cardiovascular Implants
Polyelectrolyte Multilayers*

PH.D. STUDENT IN THE SCHOOL OF ADVANCED MATERIALS DISCOVERY, COLORADO STATE UNIVERSITY

Abhishek Bhattacharjee

Advanced Nanostructured Materials for Enhancing Bioactivity

PH.D. IN BIOENGINEERING, COLORADO STATE UNIVERSITY

Dr. Anna-Laura Nelson

*Engineered mRNA Therapeutic Encoding Beta-Catenin
Accelerates Fracture Repair in a Murine Tibia Fracture Model*

SCHOLARSHIPS FOR BIOMEDICAL ENGINEERING MAJORS

Scholarship support at all levels provides critical aid to our students. We strive to help as many students as possible with the financial obligations of their engineering education. Your gift will make an impact for years to come. To support future biomedical engineers, visit <https://advancing.colostate.edu/SBME>. Below are a list of Scholarships available at the School of Biomedical Engineering:

Biomedical Engineering Alumni Scholarship: Supports a dual-degree biomedical engineering student enrolled in the School of Biomedical Engineering.

Dennis and Dorothy Bruner Biomedical Engineering Scholarship: Supports a full-time graduate or undergraduate student enrolled in the biomedical engineering program.

Joan C. King-Tobet Memorial Scholarship: Supports upper-level undergraduate students majoring in biomedical science or engineering. Must demonstrate an interest in promoting the spirit of Joan's life and gender equality in science and engineering fields and maintain an overall 3.0 GPA.

Samson Design Biotechnology Innovation Scholarship: Supports full-time graduate students majoring in biomedical engineering. Must demonstrate an interest and talent in biotechnology innovation and maintain a 3.0 GPA.

SBME Scholarship for Leadership and Innovation: Supports a full-time, upper-level undergraduate or graduate student majoring in biomedical engineering with a minimum 3.0 GPA.

A huge thank you to our donors who make it possible for our program to grow and value the continued success of our students. Your contributions to our program are invaluable and we thank you for your continued support!



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