

22<sup>nd</sup> Annual  
**Alberta Biomedical Engineering Conference**  
Program and Proceedings



October 22-23, 2021



# 22<sup>nd</sup> Annual Alberta Biomedical Engineering Conference



October 22-23, 2021

## PROGRAM COMMITTEE

### CONFERENCE ORGANIZERS

#### Co-Chairs

University of Calgary

Roman Krawetz  
Michael S. Kallos

University of Alberta

Dan Romanyk

#### Student Co-Chairs

University of Calgary

Tiffany Dang  
Thomas Lijnse  
Carina Butterworth

University of Alberta

Timothy Gadzella  
Ramin Fathian

### ABSTRACT REVIEWERS

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Michael Kallos  
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Sarah Manske  
Kartikeya Murari  
Amir Nezhad  
Holly Sparks

#### University of Alberta

James Hogan  
Albert Vette  
Lindsay Westover  
Dan Romanyk

## KEYNOTE SPEAKERS

<b>E. Paul Zehr</b>	<b>School of Exercise Science, Physical and Health Education</b> University of Victoria
<b>Kerry Black</b>	<b>Assistant Professor, Canada Research Chair</b> University of Calgary
<b>Bonnie Gray</b>	<b>School of Engineering Science</b> Simon Fraser University

## INDUSTRY SPEAKERS

<b>Meaghan Nolan</b>	<b>Co-founder &amp; COO</b> <b>Mikata Health</b>
<b>Emily Hicks</b>	<b>President and Co-Founder</b> <b>FREDSense Technologies</b>

## STUDENT TRAINEES

<b>University of Calgary</b>	Carina Butterworth Tiffany Dang Thomas Lijnse	Conference Student Co-Chairs
<b>University of Alberta</b>	Timothy Gadzella Ramin Fathian	
	Brett Abraham Stirling Cenaiko Jessica Corpuz Tiffany Dang Ramin Fathian Karson Fitzsimons Timothy Gadzella Kazim Haider Ashifa Hudani Daphne Kaketsis Samantha Leech Thomas Lijnse Julia Malinovska Conrad Mielczarek Mostafa Mohamed Monica Russell Mozghan Sabz Ainsley Smith Isabella Vandergaag	Session Chairs

**A BIG THANK YOU TO JULIANA CYR AND ALL OF OUR VOLUNTEERS  
WHO HELPED WITH THE ORGANIZATION AND PLANNING OF OUR  
CONFERENCE THIS YEAR!**

**A SPECIAL THANK YOU TO LISA MAYER  
FOR HER ONGOING SUPPORT  
OF OUR ANNUAL ALBERTA BME CONFERENCE**

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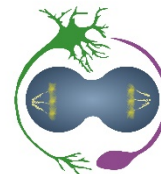


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REPRODUCTION AND REGENERATIVE MEDICINE  
Research Group

# PROGRAM

FRIDAY			
3:00 – 3:10 pm		<b>Welcoming Remarks – Dr. Michael Kallos, Dr. Roman Krawetz</b>	
		<b>Keynote Speaker</b>	
3:10 – 3:55 pm		Chair: Tiffany Dang, Timothy Gadzella	
3:10 – 3:30 pm		<b>E. Paul Zehr</b> School of Exercise Science, Physical and Health Education, University of Victoria	
3:30 – 4:00 pm		Discussion and questions	
		<b>Keynote Speaker</b>	
4:00 – 4:30 pm		Chair: Ramin Fathian, Thomas Lijnse	
4:00 - 4:20 pm		<b>Kerry Black</b> Assistant Professor, Canada Research Chair, University of Calgary	
4:20 – 4:30 pm		Discussion and questions	
<b>3 Minute Thesis, Group A</b>			
5:00 – 6:15 pm		Session Chairs: Karson Fitzsimons, Ashifa Hudani, Mostafa Mohamed	
Khan, Amina	A1	Proteomic Analysis of Mouse Embryonic Stem Cells in Dynamic Culture	Online
Cepeda Afanador , Juan Esteban	A1	Development of an Improved Nuclei Counting Method Using Crystal Violet & Triton X-100 for the Expansion of Human Bone Marrow Mesenchymal Stromal Cells in Vertical Wheel Bioreactors	Online
Gadiwan, Shaakira	A1	Using least squares system identification to mathematically model the insulin-glucose dynamic in patients with diabetes	Online
Okanlawon, Jemima	A1	A Low-Cost Bluetooth based IMU System	Online
Talaga, Kasha	A1	Combined Microwave, Ultrasound and Elastography Imaging for Breast Tissue Diagnosis	Online
Jahromi, Mohammad	A2	Compact Sonoporation Device for Exposing Fibroblast Cells to Controlled Exposure Conditions	Online



Cenaiko, Stirling	A2	Insulative Coating Design Considerations for an AC Electrothermal Micropump	Online
Sedlock, Christopher	A2	A Truncated Twisted Solenoid RF Phase Gradient Transmit Coil for Improved Single Axis TRASE Encoding	Online
Wyatt, Paige	A2	Can LEAF-Q Score Identify Bone Quality in Long Track Speed Skaters?	Online
Moore, Stephen	A2	Target identification to engineer an attenuated parasite with improved biosafety	Online
Morrison, Alida	A3	Change in Bone Void Space Measurements using HR-pQCT	In Person
Renegado, Rachel	A3	U-Net Skull Stripping Segmentation: Normalization Layers and Batch Sizes	In Person
Kaketsis, Daphne	A3	Investigating the Implications of Bone Marrow Lesions in Knee Osteoarthritis	In Person
Malinovska, Julia	A3	Investigating Pluronic as an Additive to Dynamic Culture Media for Improved Expansion and Serial Passaging of Human Induced Pluripotent Stem Cells	In Person
<b>6:15 – 7:30 pm</b>		Session Chairs: Stirling Cenaiko, Jessica Corpuz, Kazim Haider	
Johnson, Peter Anto	A4	Evaluation of a sensorimotor prosthetic trainer for patients following stroke and neurological injury	In Person
Gadzella, Timothy	A4	Characterization of Simulated Tooth Extraction: A Pilot Study	In Person
Tso, Marcus	A4	An intelligent lower body negative pressure platform for mimicking orthostatic challenge	In Person
Sidhu, Abhijot	A4	Functional and Structural Connectivity in Aging	In Person
Bader, Taylor	A4	Do Biochemical and Structural Differences in the Female Post-Menopausal Intervertebral Disc Result in Degenerative Scoliosis and Spondylolisthesis?	In Person
Addeh, Abdoljalil	A5	Reconstruction of Respiratory Volume Variations Using BOLD Signals and Neural Network	In Person
Smith, Parker	A5	Sex based comparison of in-vivo knee cartilage compression properties	In Person
Rangarajan, Sunaina	A5	Using Home Video Data to Evaluate Changes In Postural Control Associated with Robotic Gait Trainer Use	In Person
Mielczarek, Conrad	A5	Identification of Trabecular Reconnection through Registration and Skeletonization	In Person
Robertshaw, Alex	A5	Changes in the Impact Attenuation Performance of Field-Used Hockey Helmets Over Time	In Person

Soleimani, Kasra	A6	The role of the fluid stream on the bone's strain and stress fields	In Person
Peterson, Don	A6	Sarcopenia Modelling for Health Risk Assessment and Lifestyle Maintenance	In Person
Smith, Ainsley	A6	Muscle Density Analysis with Computed Tomography Internal Calibration	In Person
Fitzsimons, Karson	A6	COM velocity hodographs for gait assessment	In Person
Kakavand, Reza	A6	A Numerical Model for Split-lines Development in Articular Cartilage	In Person
<b>3 Minute Thesis, Group B</b>			
<b>5:00 – 6:15 pm</b>		Session Chairs: Brett Abraham, Tiffany Dang Mozhgan Sabz	
Neeteson, Nathan	B1	Combining machine learning and morphological post-processing to eliminate manual correction of HR-pQCT contours in tibia and radius scans	Online
Malik, Maleeka	B1	Effects of diet-induced obesity on titin isoforms and content in skeletal muscles of rats	Online
Moscoso, Graciela	B1	Printed Circuit Boards as a Practical Alternative to Cleanroom Fabricated Micropumps	Online
Lamb, Alec	B1	Development of an electrical cuff for peripheral nerve regeneration and impedance-based monitoring.	Online
Colter, James	B1	Experimental Validation of an Enhanced Embedded Systems Design for Online Monitoring of Induced Pluripotent Stem Cell (iPSC) Expansion Bioprocesses	Online
Hynková, Kristýna	B2	The effect of pre-crystallization defect size on strength limitation in lithium silicate glass dental ceramics	Online
Kuczynski, Michael	B2	Reproducibility of trapeziometacarpal joint angle measurements using dynamic CT	Online
Pedersen, Hunter	B2	Fabella Prevalence in Individuals Following Anterior Cruciate Injury Using Multi-Modal Imaging Techniques	Online
Waungana, Tadiwa	B2	Quantitative Weight-Bearing CT Imaging of Osteoarthritic Knee Joints	Online
Meulenbroek, Nathan	B2	Multi-axial Transducers for Passive Point Source Localization	Online
Lozinski, Jesse	B3	Adjustable Effort Bike Pedal System for Leg Rehabilitation	In Person
Khurelbaatar, Tsolmonbaatar	B3	Cross-section based multimodal 2D/3D registration	In Person



Leech, Samantha	B3	Protocol Development: Brain Spectroscopy and Quantitative Sensory Testing for Chronic Pain in Knee Osteoarthritis	In Person
Hesselink, Jake	B3	Isoflurane protocol optimization for focused ultrasound neuromodulation using random pulse repetition frequency modulation	In Person
<b>6:15 – 6:45 pm</b>		Session Chairs: Daphne Kaketsis, Samantha Leech, Monica Russell	
Dang, Tiffany	B4	Modelling Human Induced Pluripotent Stem Cell Scale Up in Vertical-Wheel Bioreactors Using Computational Fluid Dynamics	In Person
Sopcak, Malou	B4	Chondro-induction of human mesenchymal stem cells by coculture with engineered nasal cartilage	In Person
Aulakh, Agam	B4	Using Machine Learning To Predict Cardiovascular Risk Factors From T1-Weighted MRI Brain Scans	In Person
Jen, Nathan	B4	Designing Compliant Tubing for Ex Vivo Heart Perfusion (EVHP) Devices	In Person
Dunn, Andrew	B4	Incorporating GPU and CPU parallel processing for MRI morphology and fNIRS human brain mapping data	In Person
Park, Justin	B5	Supervised Domain Adaptation Applied to Heterogenous, Multi-Center MR Imaging Datasets	In Person
Heiser, Torri	B5	Is Force Depression Present in Cardiac Muscle?	In Person
Li, David	B5	Mechano-Hypoxia Conditioning of Human Engineered Cartilage	In Person
Veeraperumal, Thanusha	B5	Development of an Electrical Cuff for Optical-Based Peripheral Nerve Monitoring and Regeneration	In Person
<b>Reception</b>			
<b>7:35 – 10:00 pm</b>		Reception	

**SATURDAY**

**Podium Presentations**

<b>8:00 – 9:30 am</b>		Session Chairs: Stirling Cenaiko, Julia Malinovska, Isabella Vandergaag	
	Hansen, Ayden	Applications of Near-Infrared Spectroscopy in Multiple Sclerosis	In Person
	Lijnse, Thomas	Evaluation of Microneedle Design and Fabrication Strategies	In Person
	Walker, Kayla	Arm and shoulder kinematics in rope pulling: Extending occupational function inferences from a new behavioural experimental task	In Person
	Rai, Shefali	Precise patterns of reliability in functional brain networks	In Person
	Der, Jason	Use of Active Stereo Vision to Measure Regional Lung Distension During Ex-Vivo Lung Perfusion	In Person
	Tosh, Conor	Cue-action synchrony is decreased amongst late night participants in a rope pulling task	In Person
	Hassanpour Tamrin, Sara	Label-Free Exosome Isolation Technology for Early Diagnosis of Cancer	Online
	Eberts, Mackenzie	Bone quality was not influenced by high-dose alendronate therapy in a preclinical model of osteoporosis	Online
<b>9:30 – 9:45 am</b>		<b>Coffee Break</b>	
		<b>Keynote Speaker</b>	
<b>9:45 – 10:15 am</b>		Chair: Ramin Fathian, Daphne Kaketsis	
	9:45 – 10:05 am	<b>Bonnie Gray</b> School of Engineering Science, Simon Fraser University	
	10:05 – 10:15 am	Discussion and questions	
<b>Podium Presentations</b>			
<b>10:30 – 12:00 pm</b>		Session Chairs: Mostafa Mohamed, Ainsley Smith, Conrad Mielczarek	
	Corpuz, Jessica	Intervertebral Disc Degeneration in a Novel Murine Model	In Person
	Shafqat, Qandeel	9.4T MRI detects reductions in cerebral blood flow and increases in deoxyhemoglobin marker R2* in a mouse model of systemic inflammation	In Person
	Bzowey, Natasha	Focal Changes in T2 Relaxation Time of Loaded Cadaver Femoral and Tibial Cartilage	In Person

Tahghighi, Peyman		Canine Spine Segmentation Using Conditional Generative Adversarial Networks	In Person
Tissera, Savithi		Alendronate treatment increases bone density and does not reduce fatigue life in hind-limb bones of ovariohysterectomized rabbits	Online
Zeinali Danalou, Sima		Using Synchrotron X-ray CT to Study Pharmaceutical Powders Mixing Quality and Granulation	Online
Islam, Md Manirul		Development of a Machine Learning based Automated System for Detecting Muscle Fatigue using sEMG Signal Associated with Voluntary Contraction in Real-Time	Online
Soriano, Jan Elaine		Long-term neuroprosthetic hemotherapy treats autonomic dysreflexia after spinal cord injury	Online
<b>12:00 – 1:15 pm</b>		<b>Lunch Break</b>	
		<b>Industry Panel</b>	
<b>1:15 – 2:15 pm</b>		Chair: Timothy Gadzella, Isabella Vandergaag	
		<b>Meaghan Nolan</b> Co-founder & COO, Mikata Health <b>Emily Hicks</b> President and Co-Founder, FREDsense Technologies	
<b>Podium Presentations</b>			
<b>2:30 – 3:25 pm</b>		Session Chairs: Monica Russell, Thomas Ljinse, Brett Abraham	
Ahadzadeh Ardebili, Aria		Relationship between femoral shaft strains and fracture location in patients with atypical femoral fractures	Online
Potvin, Sacha		The Effects of the COVID-19 Pandemic on Patient Well-being	Online
Hudani, Ashifa		Four-Dimensional Blood Flow Analysis of Abnormal Right Ventricular Hemodynamic in Patients with repaired Tetralogy of Fallot	In Person
Le, Tina		Effect of age on deformation of a tissue crack in articular cartilage	In Person
Huang, Lisa		Gamification of a BCI Spelling Application for Children with Severe Physical Disabilities	In Person
<b>3:25 – 3:40 pm</b>		<b>Coffee Break</b>	
<b>Podium Presentations</b>			
<b>3:40 – 5:15 pm</b>		Session Chairs: Mozghan Sabz, Ramin Fathian, Timothy Gadzella	

Khan, Sonia		Stable Cavitation Detection Methods for Focused Ultrasound BBB Disruption	Online
Abbas, Huda		Impact of Best Modeled Transport on Hospital Patient Volumes, Quantified Outcomes and Healthcare Cost Savings	Online
Johnson, Bailey		Development of Alberta-Made Respirators During the COVID-19 Pandemic	In Person
Alizadeh Sardroud, Hamed		In vitro and in vivo study of force-shielding effect on hyaline cartilage regeneration in mechanically loaded 3D-bioprinted constructs	In Person
Abraham, Brett		Recombinant Protein Production for use in Suspension Bioreactor Microcarrier Culture	In Person
Bessa, Guilherme		Effect of material compliance properties of a mock aorta on the generated pressure waveforms for an ex-vivo heart perfusion (EVHP) system	In Person
Keen, Christopher		Semantic segmentation for fracture detection in pediatric wrist ultrasound	In Person
Stahl, Alana		Examination of Bone Deposition in Ovariectomized Cynomolgus Monkeys post-Antiresorptive Treatment	In Person
Shin, Joonhwan		Development of Robotic 3D Bioprinting Platform	In Person
<b>6:00 – 7:30 pm</b>		<b>Dinner</b>	
<b>7:30 – 7:40 pm</b>		<b>Closing Remarks – Dr. Michael Kallos, Dr. Roman Krawetz</b>	



## UNIVERSITY OF CALGARY Biomedical Engineering Graduate Program

The Biomedical Engineering Graduate Program at the University of Calgary offers a unique opportunity to work with leading researchers across campus to advance knowledge and find solutions to improve human

animal health and wellness. Collaborate with world-leading researchers in Engineering, Kinesiology, Medicine, Nursing, Science and Veterinary Medicine to make new discoveries, to expand the field of biomedical engineering and make a difference in the lives of people around the globe.

The Biomedical Engineering Graduate Program is a key component of The University of Calgary’s Eyes High vision and supports both the university’s academic and research plans, particularly the strategic research theme

**Engineering Solutions for Health: Biomedical Engineering.** It is an established program supporting a diverse research community with a strong focus on student success.

### Priority Research Themes



#### Integrated approaches to enable prevention of injury and disease and support healthy aging

**Goal: To invent and implement technologies that will keep people healthy and minimize complications from diseases, while also helping predict injury and illness.**

Engineering methodologies can increase our fundamental understanding of human and animal health and disease across the lifespan. Based on this understanding, new integrated biomedical engineering technologies and solutions will be created for monitoring health and promoting prevention. Imagine a family member recovering from a heart attack – biomedical technologies will allow us to assess their disease type, limit disease progression and prevent loss of quality of life, while also identifying whether younger family members are at risk for heart disease.



#### Technologies for improved diagnostics

**Goal: To develop more accurate imaging and diagnostics to detect disease earlier, provide biomarkers for evaluating new therapies, and enable personalized treatments optimized for the individual patient.**

Early and accurate detection is crucial to precisely identify and treat the correct disease or dysfunction. Biomedical engineering offers ways to develop new instrumentation, data handling systems, and technologies that assess organ and body function, dysfunction, and disease at earlier stages, with higher sensitivity, and with more high quality information. Having an earlier and more accurate diagnosis greatly improves the chances of successful treatment leading to better outcomes following injury or disease.



## Engineered novel therapeutics

**Goal: To develop high-quality, long-lasting treatments for injury and disease, based on stem cells, targeted drugs and novel devices.**

Developing novel therapeutic devices and molecular medicines and harnessing the power of stem cells to exploit the body's inherent repair mechanisms will be advanced by biomedical engineering technologies. With a focus on developing new personalized treatments to repair, regenerate or replace dysfunctional cells and tissues, these integrated therapies are designed to work with the body's natural healing processes. By using the body's own cells, the need for donors is eliminated, the chance of infection is reduced, and the overall outcome is a solution that functions more closely to the native cells or tissue.



## Emerging theme: Optimized health care system performance

**Goal: To deliver research built on our emerging strengths, using engineering tools and approaches to improve patient flow through the health care system.**

Engineering tools and approaches are ideally suited to improving the flow of patients, data and resources through the healthcare system. Research within this theme will investigate new tools for evaluating healthcare system performance and technology assessment. Operational modelling technologies at the University of Calgary will ensure that all patients are able to access the care they need by optimizing the system for delivery of care – this will maximize the chances of a full recovery from a medical event.

**FOR MORE INFORMATION** about applying into our Biomedical Engineering Graduate Program, University of Calgary, please contact:

Biomedical Engineering Graduate Program Office  
ENB 202 Schulich School of Engineering Building  
Main Campus 2500 University Drive NW, Calgary, Alberta,  
T2N 1N4 EMAIL: [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca)  
<https://research.ucalgary.ca/bme/home>

Biomedical Engineering

# Ready to make a difference

Located in the engineering capital of Canada, the University of Calgary's Biomedical Engineering program is advancing knowledge and solving problems in animal and human biology, medicine and health-care by educating the next generation of leaders.

## Ready to contribute

Our undergraduate students have the strengths of a traditional engineering degree at the Schulich School of engineering, advanced knowledge of biomedical engineering and valuable hands-on work experience.

## Multi-disciplinary teamwork

Our graduate students participate in teams with researchers in engineering, kinesiology, medicine, nursing, science and veterinary medicine at an institution committed to investing significantly in biomedical research.

## Partners in Research

Researchers work towards making an impact through scientific discoveries, innovative and market-driven technologies, and solutions to enhance the wellness and well-being of all throughout the lifespan. We look for opportunities to link with industry and international entities to provide market-ready graduates and R&D solutions.

**collaborative, skilled and experienced – the University of Calgary's biomedical engineers are ready to help your team make a difference today.**

[ucalgary.ca/bme](http://ucalgary.ca/bme)

graduate email [bmegrad@ucalgary.ca](mailto:bmegrad@ucalgary.ca)

undergraduate email [bme.undergraduate@ucalgary.ca](mailto:bme.undergraduate@ucalgary.ca)

research email [bme@ucalgary.ca](mailto:bme@ucalgary.ca)



UNIVERSITY OF  
CALGARY







**Kerry Black, Keynote Speaker**  
**Assistant Professor and Canada Research Chair**  
**University of Calgary**

Kerry Black is an Assistant Professor and Canada Research Chair in the Center for Environmental Engineering Research and Education (CEERE) and the Department of Civil Engineering, at the University of Calgary. Her focus is to engage in a cross-disciplinary research platform, incorporating technical civil and environmental engineering principles and research, with policy and socio-economic components, focusing on sustainable infrastructure for healthy and resilient communities.

Over the past 12 years, she has worked extensively in the academic, public, private and non-profit sectors, employed in technical, scientific, policy, and management roles. The majority of this experience has included working with Indigenous communities on urgent and pressing water and infrastructure issues across Canada.



**E. Paul Zehr, Keynote Speaker**  
**Professor, University of Victoria**  
**Director, Centre for Biomedical Research**

E. Paul Zehr, PhD is sensorimotor neuroscientist by day and superhero science ninja by night. An award-winning author and science communicator, martial artist, and professor at the University of Victoria, he is a veteran panelist at San Diego International Comic Con, New York Comic Con and Anaheim Wondercon. His popular science books “Becoming Batman”, “Inventing Iron Man”, “Project Superhero” and “Chasing Captain America” use superheroes as metaphors exploring the science of human potential. His popular science books “Becoming Batman”, “Inventing Iron Man”, “Project Superhero” and “Chasing Captain America” use superheroes as metaphors exploring the science of human potential.

In 2015 he won the Science Educator Award from the Society for Neuroscience and Project Superhero won the Silver Medal for Juvenile fiction from the Independent Book Sellers of North America. In 2019 he received the UVic REACH Award for outstanding graduate student mentorship and supervision. He blogs at Psychology Today and Scientific American magazines.



**Bonnie Gray, Keynote Speaker**  
**Professor**  
**Simon Fraser University**

Bonnie L. Gray joined the School of Engineering Science (ENSC) at Simon Fraser University (SFU) in Canada in 2003, where she is now a Full Professor, former ENSC Graduate Program Chair, and an elected member of University Senate. Dr. Gray is an Associate Member of the School of Biomedical Physiology and Kinesiology and sits on the Advisory Board for the Vancouver Medical Device Development Centre. Dr. Gray has over 140 peer-reviewed journal and conference publications, including 25 invited and keynote papers. She has 3 issued patents on conductive polymer nanocomposites, and wearable and reconfigurable microfluidics, and 4 invited book chapters.

Dr. Gray is a dedicated mentor and the 2014 recipient of the *SFU Dean of Graduate Studies Award for Excellence in Supervision*. Dr. Gray was the Chapter Chair for the Vancouver IEEE Electron Devices Society (EDS) from 2007-2017, and organizer of two mini-colloquia in 2012 and 2017. She has chaired the *SPIE Conference on Microfluidics, BioMEMS, & Medical Microsystems* from 2014-2021; been a member of the program committee for the 2020 and 2021 *IEEE MEMS* conferences; was a member of the International Advisory Committee for the 2019 *IEEE Nanotechnology Materials and Devices Conference*; and the Publicity Chair for the 2021 *IEEE Nanotechnology Materials and Devices Conference*.

Her current research interests include the development and application of novel materials and fabrication techniques for biomedical, microfluidic, and acoustic devices and systems; development of flexible and wearable microfluidic and biosensor technologies; point-of-care instruments; personalized medicine; chip-based biological cell sorting and trapping methods; and self-sterilizing textiles and 3D objects.



**Emily Hicks, Industry Panelist**  
**President, FREDsense Technologies Corp**

A graduate of the University of Calgary and an alumnus of Singularity University, Emily is currently President and co-founder of FREDsense Technologies. Coupling genetic engineering and electrochemistry, FREDsense creates portable devices that enable anyone, anywhere to measure trace contaminants in water. Currently in-use by utilities and mining companies, FREDsense has won a number of awards including the Queen's Entrepreneurship competition, Singularity University's Global Grand Challenge for water and the She Loves Tech Global competition.

An avid public speaker, Emily has received several recognitions including being a global finalist in the Institution of Engineering and Technology's Present Around the World competition as well as an invited speaker for Singularity University, The Atlantic and Oxford University. Emily is a Kairos fellow, has been a top 30 under 30 in Canada for Sustainability and was recently awarded an Arch award from the University of Calgary for Early Career Achievement.



**Meaghan Nolan, Industry Panelist**  
**Co-founder and COO, Mikata Health**

Meaghan is co-founder and COO of Mikata Health. She earned her Bachelor's degree in Health Sciences and MSc in Health & Exercise Physiology both from the University of Calgary. Prior to starting Mikata Health, Meaghan was a Lead User Experience Designer in New York City, NY working with Fortune 100 companies in healthcare and other industries. Digital products she has designed are in use today by thousands of people around the world. She has experience leading large, multi-disciplinary teams to bring digital products to life.



The Alberta Children's Hospital Research Institute (ACHRI) was founded in 2009 as a partnership between the [University of Calgary](#), [Alberta Health Services](#) and the [Alberta Children's Hospital Foundation](#). Our shared vision is to support research for the health and wellness of children and families.

More than 330 passionate ACHRI researchers work in laboratories and as health care providers in hospitals, clinics and in the community – all with the goal to make a difference in the lives of children and their families through new discoveries, better treatments and public health policies.

We couldn't do what we do without the generous support from our community through the [Alberta Children's Hospital Foundation](#), and our collaborations with [Alberta Health Services](#).

We focus on building capacity, integrating research and clinical care, and partnering with our community to solve the most pressing challenges facing children and families here and beyond.

ACHRI supports researchers by offering research space, leading-edge technologies, expert research services and funding support. We invest in the next generation of scientists through trainee scholarships, knowledge translation opportunities, and trainee awards.

The University of Calgary and the Alberta Children's Hospital are now first in Canada to make child health a priority for research. The Child Health and Wellness Strategy is led by [ACHRI](#) in partnership with [Alberta Health Services](#), the [Alberta Children's Hospital Foundation](#), and our visionary community to create a better future for children through research. This collaborative community includes investigators from: [Arts](#), [Cumming School of Medicine](#), [Kinesiology](#), [Nursing](#), [Owerko Centre](#), [Schulich School of Engineering](#), [Science](#), [Social Work](#), [Veterinary Medicine](#) and [Werklund School of Education](#).

Collaborations with [Cumming School of Medicine Research Institutes](#), [Infections, Inflammation and Chronic Diseases](#), [Human Dynamics in a Changing World](#), [Engineering Solutions for Health, Brain and Mental Health](#), [ii' taa'poh'to'p](#) and [UCalgary Equity, Diversity and Inclusion](#) are critical to accelerating outcomes.





The [Life Sciences Fellowship](#) wants you to join our successful community of innovators and get funding and support to launch and grow your start-up.

Activated by [Innovate Calgary](#) at the [Life Sciences Innovation Hub](#), the [Life Sciences Fellowship](#) will accelerate getting your Life Sciences solution to market with:

- \$200k in grant funding including salary support for one fellow
- Startup equipment, space and expert support
- Professional Development

All with virtually no strings attached.

Check out <https://innovatecalgary.com/life-sciences-fellowship/> and connect with Jane Desrochers [jdesrochers@innovatecalgary.com](mailto:jdesrochers@innovatecalgary.com) to learn more.



# About the Libin Cardiovascular Institute

*Connecting cardiovascular research, education and care*

The Libin Cardiovascular Institute is a joint entity of Alberta Health Services and the University of Calgary that connects all cardiovascular research, clinical care and education in Southern Alberta. It serves a population of about two million. Our more than 1,500 members include physicians, clinicians and other health professionals, researchers and trainees from a range of disciplines.

The Libin Cardiovascular Institute was established on Jan. 27, 2004 thanks to a generous foundation from the Alvin and Mona Libin Foundation. The Libin Cardiovascular Institute is the only institution in Canada to offer a single cardiovascular program, which promotes a high standard of care across the city and region.

## **Our Mission**

We will leverage our unique capabilities to advance patient-centered, value-based “next” practices that will enhance patient reported outcomes, increase access to care and improve quality at the same time as reducing costs.

## **Our Vision**

To lead and transform health care using precision cardiovascular health platforms.

## **Our Members**

- Educate and train the next generation of health-care providers and researchers.
- Provide world-class treatment for patients.
- Conduct ground-breaking clinical and basic science research.

## **Our Key Initiatives**

### **Clinical Innovation Initiative**

The Clinical Innovation Initiative exists to connect clinician-scientists and researchers within the Libin Cardiovascular Institute to bolster the academic acumen and leadership potential of the Institute’s clinical members. The initiative actively supports and engages the physicians, nurses, nurse practitioners and other health-care providers affiliated with the institute. Activities within this initiative include peer support, mentorship, wellness initiatives, clinical program development, staff education needs and fostering relationships between clinician-scientists and researchers.

### **Person to Population Research Group (P2)**

P2 is a multidisciplinary team of researchers and clinicians committed to improving cardiovascular health in Alberta at the individual and population level. We conduct epidemiological, clinical and health system research with the goal of improving the health of all Albertans, including defined groups who may be at higher risk due to lifestyle, environment, financial and social factors. Our goals are to increase awareness of the impact of these factors for the prevention, care, and outcomes of Albertans; increase the provision of personalized care; improve collaboration among scientists in Alberta; reduce overall risk of cardiovascular disease in Alberta. Our members have knowledge and expertise across a breadth of issues and methods. This includes clinical research, health services research, statistics, health economics and implementation sciences. Learn more at [libin.ucalgary.ca/p2](https://libin.ucalgary.ca/p2).

### **Data Initiative**

The Data Initiative is designed to harness the potential of the vast amounts of cardiovascular data captured by our health system and use it to inform clinical decision-making, advance health research and ultimately improve patient outcomes. The work of the Data Initiative includes linking existing data assets through the development of an integrated cardiovascular data set; developing training and resources; and providing streamlined supports for researchers, clinicians and project teams to access, analyze and use the data to benefit cardiac patients.

### **Women's Cardiovascular Health Initiative**

In 2019, the Libin Cardiovascular Institute introduced the Women's Cardiovascular Health Initiative, a formal program in women's cardiovascular health. Libin members are committed to positively impacting women's cardiovascular health across the life cycle through research, education and clinical care. In addition, we are engaging with the Calgary community and across Southern Alberta to raise awareness about women's cardiovascular disease - the risks, symptoms and recovery.

*Learn more about the Libin Cardiovascular Institute at <https://libin.ucalgary.ca/> or follow us on Twitter at @LibinInstitute, Facebook at @LibinInstituteAB and Instagram at @LibinInstitute. Contact us at [libin@ucalgary.ca](mailto:libin@ucalgary.ca).*



# ***Mobility for Life.***

## **The McCaig Institute for Bone & Joint Health**

Tracing its beginnings back to 1984, the McCaig Institute for Bone and Joint Health is comprised of basic scientists, orthopedic surgeons, rheumatologists, radiologists, kinesiologists and biomedical engineers, all working together to understand, prevent, diagnose and develop new treatments for bone and joint conditions.

### **Vision**

Leading the improvement of musculoskeletal health for patients across their lifespan through research and education.

### **Mission**

To enhance the musculoskeletal health of Albertans by focusing our efforts on a “precision medicine” approach to research: tailoring the right intervention for patients at the right time.

### **Opportunities for collaboration**

#### **The Centre for Mobility and Joint Health**

The Centre for Mobility and Joint Health (MoJo) features state-of-the-art imaging, movement assessment and diagnostic equipment for clinical trials, clinical assessments and research studies. The MoJo is designed to accelerate solutions to bone and joint problems and translate basic science into real-world clinical solutions. The imaging equipment and technology are available for clinicians, scientists and companies on a fee-for-service basis. If you are interested in conducting research at the MoJo, please visit [mccaig.ucalgary.ca/mojo](http://mccaig.ucalgary.ca/mojo) and contact [mojo@ucalgary.ca](mailto:mojo@ucalgary.ca).

#### **The Mobility for Life Project**

The *Mobility for Life Project* is a long-term research study of how bone and joint diseases develop and progress over time. The goal of the project is to form a comprehensive musculoskeletal health database to help researchers identify early indicators of disease, improve diagnosis and target effective treatment. By creating a large pool of pre-qualified participants, the *Mobility for Life Project* aims to make studies focused on musculoskeletal health and disease faster, better, and more innovative. [mccaig.ucalgary.ca/mobility-for-life](http://mccaig.ucalgary.ca/mobility-for-life)

*Learn more at [mccaig.ucalgary.ca](http://mccaig.ucalgary.ca) or contact us at [mccaig@ucalgary.ca](mailto:mccaig@ucalgary.ca)*



# *Biomedical Engineering at the University of Alberta*

*Biomedical engineering is at the forefront of one of the most rewarding areas of engineering, applying the principles and methods of engineering to medicine by engaging in research and teaching. The advances we make today will be seen in medicine tomorrow.*

## DIVERSE AREAS RESEARCH

Research in biomedical engineering at the University of Alberta is exceptionally diverse, spanning four engineering departments and driving collaboration with many other faculties and institutions. A variety of research topics are explored at the university including:

- **Nanotechnology:** Leveraging advances in nanotechnology to develop new methods for drug delivery, wound healing, and nano-scale diagnostic devices.
- **Medical imaging:** Developing physical concepts and algorithms to improve ultrasound, MRI, CT, and optical modes of imaging to advance diagnostics and rehabilitation medicine.
- **Biomechanics And Rehabilitation Engineering:** Applying principles of basic science and engineering design to find solutions to problems in human movement, sport, and daily life—think about prosthetics, orthotics, and assistive devices.
- **Tissue Mechanics:** Material testing and computer modelling provide new insight into bone and soft tissue mechanics (e.g. bone fracture), and medical device design.
- **Microelectrical mechanical systems:** Exciting research in device design ranging from wearable monitors and compliant sensors to lab-on-a-chip microdevices.
- **Cryobiology:** The study of cold-adaptation, preservation of organs under hypothermic conditions for transplantation, lyophilization (freeze-drying) of pharmaceuticals, and cryosurgery.

## AN INSTITUTIONAL SUPPORT NETWORK FOR BIOMEDICAL ENGINEERING

Manufacturing, prototyping facilities and laboratories in Engineering at Alberta support biomedical engineering researchers and our collaborators. Key facilities include:

- The [NanoFAB](#) at the Nanotechnology Research Center which houses nano-scale x-ray and microscopy facilities
- Dedicated machine and fabrication services
- Access to campus-wide maker spaces such as the [Elko Engineering Garage](#), the Digital Scholarship Centre, and [The Shack](#)

## A GLOBAL INTERDISCIPLINARY EFFORT

Our biomedical engineering faculty and students share space and ideas with other researchers from world-renowned institutions such as:

- The Glenrose Rehabilitation Hospital
- The Royal Alexandra Hospital
- The National Research Council Nanotechnology Research Centre

## OPPORTUNITIES FOR STUDENTS

There are five engineering departments at the University of Alberta with 4800 undergraduate students and 1700 graduate students, many of whom study biomedical engineering problems. Our departments are:

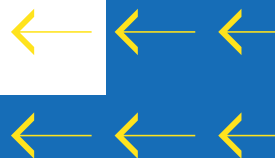
- Mechanical Engineering
- Chemical and Materials Engineering
- Electrical and Computer Engineering
- Civil Engineering
- Biomedical Engineering (graduate programs only)

Undergraduate students can earn a degree in Mechanical Engineering with the Biomedical Engineering Option, which includes co-op and clinical terms in addition to specialized courses.

**LEARN MORE** 

Graduate students can pursue doctoral (PhD) and master's (MSc) degrees in any of our engineering departments. Some departments have additional specialized programming available, such as a combined MEng/MBA program hosted by Chemical and Material Engineering.

**LEARN MORE** 





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## NOTES