

University of Calgary
16th Annual Biomedical Engineering
Undergraduate Summer Research Symposium
August 17th, 8:00 AM – 4:30 PM in HPL

Thank you for participating in the 16th Biomedical Engineering Undergraduate Summer Research Symposium!

The Biomedical Engineering Summer Symposium is an opportunity for undergraduate students to showcase their summer work, practice their presentation skills, and learn about the exciting biomedical research being conducted at the University of Calgary.

Many of the student presenters have received awards allowing them to participate in academic research, and their presentations cover a range of topics including human mobility, biomedical imaging, regenerative medicine, medical technology, health management & monitoring, and precision diagnostics.

[View Abstracts Here!](#)

Presentations are 8 minutes with 2 minutes for questions.



**BIOMEDICAL
ENGINEERING**
Graduate Students'
Association



UNIVERSITY OF CALGARY
Biomedical Engineering Graduate Program

Acknowledgments: Thank you to Dr. Walter Herzog for sponsoring the presentation prizes and sponsoring the event. Thank you to the Department of Biomedical Engineering and BMEG for their help in organizing this event and for sponsoring the abstract prize. Thank you to the graduate volunteers, session chairs, and judges. Lastly, thank you to all the presenter and supervisors for making this event possible!

Event Sponsored By:
Dr. Walter Herzog and Department of Biomedical Engineering

Symposium Schedule:

8:00 - 8:45	Coffee and Snacks	
8:45 - 9:00	Introduction and Welcome Remarks (Dr. Michael Kallos, Head of Department of Biomedical Engineering) (KNB 214)	
9:00 - 9:20	Keynote Presentations by Dr. Richa Pandey, PhD (KNB 214)	
9:20 - 10:40	Session 1 (Human Mobility) Presentations (KNB 214)	Session 2 (Medical Imaging) Presentations (KNB 427)
10:40 - 10:50	Coffee/Snack Break	
10:50 - 12:10	Session 3 (Human Mobility) Presentations (KNB 214)	Session 4 (Medical Imaging) Presentations (KNB 427)
12:10 - 1:00	Lunch	
1:00 - 2:30	Session 5 (Regenerative Medicine and Novel Medical Technologies) Presentations (KNB 214)	Session 6 (Health Monitoring/Management and Precision Diagnostics) Presentations (KNB 427)
2:30 - 2:50	Coffee/Snack Break	
2:50 - 4:00	Session 7 (Regenerative Medicine and Novel Medical Technologies) Presentations (KNB 214)	Session 8 (Health Monitoring/Management and Precision Diagnostics) Presentations (KNB 427)
4:00 - 4:15	Short Break	
4:15 - 4:30	Closing Remarks, Announcements, and Awards Presentation (KNB 214)	

Keynote Speaker

We are excited to announce our keynote speaker, Dr. Richa Pandey!

Dr. Richa Pandey is an Assistant Professor at the Department of Biomedical Engineering where she has established WeBiT, the Wearable and Bio-Integrated Technologies Laboratory with a vision to create disruptive technologies to engineer health solutions by using a multidisciplinary and translational approach.



Session 1 – Human Mobility (KNB 214)

Session Chair: Karson Fitzsimons
Judges: Kirsten Bott and Sam Leech

9:20 – *The Effect of Forearm Crutch Length on Upper Limb Kinematics*

Presenter: Amanda Chen
Supervisor: Dr. Ranita Manocha

9:30 – *Effects of Cyclic Loading Interruption on Bovine Cortical Bone*

Presenter: Tudor Muresan
Supervisor: Dr. Brent Edwards

9:40 – *How do Changes in pH Affect Stress in Titin?*

Presenter: Nikhil Srivalsan
Supervisor: Dr. Walter Herzog

9:50 – *Tibial Acceleration is not a Valid Surrogate Measure for Predicting Musculoskeletal Loads*

Presenter: Jean Tu
Supervisor: Dr. Brent Edwards

10:00 – *Active Force of Skinned Muscle Fibers in Children with Cerebral Palsy*

Presenter: Gavin Thomas
Supervisor: Dr. Venus Joumaa & Dr. John Holash

10:10 – *Sorting Out the Stay: Predicting Tendon Strain in Horses*

Presenter: Sammy Patwary
Supervisor: Dr. John Bertram

10:20 – *Investigating Sarcomere Length Non-Uniformity and Force in Immunofluorescent Labelled Skeletal Rabbit Psoas Muscles*

Presenter: Dhairya Desai
Supervisor: Dr. Walter Herzog

10:30 – *The Effect of a 3-week Delayed Prebiotic Fiber Intervention on Fat Infiltration in the Vastus Lateralis Muscle of Female Sprague-Dawley Rats*

Presenter: Arman Murani
Supervisor: Dr. Walter Herzog

Session 2 – Medical Imaging (KNB 427)

Session Chair: Isabella Vandergaag
Judges: Jessica Corpuz and Hannah Smith

9:20 – *Dilated Cardiomyopathy MRI Analysis*

Presenter: Maggie Mallabone (Zoom)
Supervisor: Dr. James White

9:30 – *Establishment of Sex- and Site-Specific Normative Data for Adults Using Dual X-Ray Absorptiometry*

Presenter: Liam Pond
Supervisor: Dr. Steven Boyd

9:40 – *Reproducibility of the TMS3 Microwave Breast Imaging System*

Presenter: Amy Wang
Supervisor: Dr. Elise Fear

9:50 – *3D Modelling of Clinical CT for the Development of a Subject Specific Assessment of Fracture Risk*

Presenter: Alexander Iwasyk
Supervisor: Dr. Steven Boyd & Dr. Peter Salat

10:00 – *Application of Void Space Procedure to HR-pQCT Images of Human Knees Following ACL Injury*

Presenter: Mateo Rueda
Supervisor: Dr. Steven Boyd

10:10 – *Comparing Joint Space Parameters Between Healthy and Arthritic Metacarpophalangeal (MCP) Joints*

Presenter: Dani Contreas
Supervisor: Dr. Sarah Manske

10:20 – *Validation of a Microwave Breast Imaging System*

Presenter: Baldeep Grewal
Supervisor: Dr. Elise Fear

10:30 – *3D U-Net Segmentation for White Matter Hyperintensities*

Presenter: Nita Das
Supervisor: Dr. Richard Frayne

10:40 – 10:50: COFFEE/SNACK BREAK

Session 3 – Human Mobility (KNB 214)

Session Chair: Karson Fitzsimons
Judges: Kirsten Bott and Sam Leech

10:50 – *Residual Force Enhancement: Active versus Passive Contribution*

Presenter: Wejdaan Faridi
Supervisor: Dr. Walter Herzog & Dr. Venus Joumaa

11:00 – *Effect of Prebiotic Fibre Supplementation on Macrophage Infiltration in Adipose Tissue of Obese Rats*

Presenter: Riya Kalaga
Supervisor: Dr. Walter Herzog

11:10 – *The Effect of Hold Time on Immunoglobulin Domain Unfolding in Myofibrils Stretched Passively*

Presenter: Chris Tiessen
Supervisor: Dr. Walter Herzog

11:20 – *The Effect of Freezing on The Mechanical Properties of Skeletal Muscle Fibers*

Presenter: Mahmoud Abu Sara
Supervisor: Dr. Walter Herzog

11:30 – *Pectoralis Major and Latissimus Dorsi Activity during Forearm Crutch-Assisted Swing-Through Gait*

Presenter: Joshua Ellis
Supervisor: Dr. Ranita Manocha

11:40 – *Collagenase for Cerebral Palsy: Analysis of Collagen Content in Collagenase Incubated Samples*

Presenter: Ireland Lawson
Supervisor: Dr. Venus Joumaa

11:50 – *Can Footworn Sensors Measure Kinematic Changes during Fatiguing Community-based Walking in an Individual with Mobility Impairments? A Case Study*

Presenter: Mahika Sharma
Supervisor: Dr. Elizabeth Condliffe

12:00 – *Understanding Robotic Gait Trainers Usage Data for Children with Cerebral Palsy*

Presenter: Tyler Santos
Supervisor: Dr. Elizabeth Condliffe

Session 4 – Medical Imaging (KNB 427)

Session Chair: Isabella Vandergaag
Judges: Jessica Corpuz and Hannah Smith

10:50 – *Complex-valued Convolutions for MR Reconstruction Using U-Nets*

Presenter: Duncan Boyd
Supervisor: Dr. Richard Frayne

11:00 – *Enhancing the Preprocessing Pipeline for Image Translation Models to make Beta-Amyloid Positron Emission Tomography (PET) from Structural Magnetic Resonance Imaging (MRI)*

Presenter: Ahmed Elmenshawi
Supervisor: Dr. Ethan MacDonald

11:10 – *Additive Manufacturing of Intracortical Bone Microarchitecture to Examine Fatigue-life Variation*

Presenter: Jenny Hua
Supervisor: Dr. Brent Edwards

11:20 – *Evaluating a Bone Erosion Detection Algorithm on Cone Beam CT Data*

Presenter: Ivan Hu
Supervisor: Dr. Sarah Manske

11:30 – *Exploration of Biological Sex in Magnetic Resonance Imaging – a Literature Review*

Presenter: Daniel Austin
Supervisor: Dr. Mariana Bento

11:40 – *Using Quantitative Susceptibility Mapping to Understand Persistent Post-Concussion Symptoms*

Presenter: Muhammad Ansari
Supervisor: Dr. Ashley Harris

11:50 – *The Great Unification – Harmonization of Computational Backends for GPU-Based Transcranial Ultrasound Modelling*

Presenter: Andrew Xie
Supervisor: Dr. Samuel Picardo

12:00 – *Measurement of C-fos and Protein Expression After LIFU Application to the Hippocampal Region of the Rat Brain*

Presenter: Aryan Zawari
Supervisor: Dr. Zelma Kiss

12:10 – 1:00: LUNCH BREAK

Session 5 – Regenerative Medicine and Novel Medical Technologies (KNB 214)

Session Chair: Tiffany Dang
Judges: Justin Tse and Daphne Kaketsis

1:00 – *Musical Application of Brain-Computer Interfaces for Children with Complex Physical Needs*

Presenter: Shekinah Arpon
Supervisor: Dr. Adam Kirton

1:10 – *Automating the Fabrication of Medical-Grade Cannulae*

Presenter: Anthony Demong
Supervisor: Dr. Colin Dalton

1:20 – *Profiling the Pi: Running a Brain-computer Interface Pipeline on the Raspberry Pi*

Presenter: Adam Gulamhusein
Supervisor: Dr. Adam Kirton

1:30 – *Optimizing Printed Circuit Boards Parameters for ACET Micropumps*

Presenter: Peter Luong
Supervisor: Dr. Colin Dalton

1:40 – *The Effect of Proteoglycan 4 on Disc Integrity and Functionality*

Presenter: Samantha Heschl
Supervisor: Dr. Roman Krawetz

1:50 – *Examination of Bone Turnover Markers in Ovariectomized Cynomolgus Monkeys post-Antiresorptive Treatment*

Presenter: Alana Stahl
Supervisor: Dr. Roman Krawetz

2:00 – *Microneedle Array Load Factors*

Presenter: Catherine Betancourt Lee
Supervisor: Dr. Colin Dalton

2:10 – *Material Investigation for the Development of ECMO Cannula*

Presenter: Joshua Feddema
Supervisor: Dr. Colin Dalton

Session 6 – Health Monitoring/Management and Precision Diagnostics (KNB 427)

Session Chair: Andrew Koshyk
Judges: Annie Bugbird and Isabella Vandergaag

1:00 – *Bacterial Cellulose as Packaging Material Alternative*

Presenter: Catherine Ko (Zoom)
Supervisor: Dr. Mayi Arcellana-Panlilio

1:10 – *Simulating Post-Surgical Adhesions Using Microfluidics Flow Chambers*

Presenter: Monica Aida Lopez
Supervisor: Dr. Paul Kubes

1:20 – *Does Botox Induced Paraspinal Muscle Weakness Cause Osteoarthritis-like Damage in Facet Joints?*

Presenter: Torri Heiser
Supervisor: Dr. Walter Herzog

1:30 – *Examining Location of Residence and Driving Behaviors: A Machine Learning Study on Rural-Urban Driver Differences*

Presenter: Maria Law
Supervisor: Dr. Sayeh Bayat

1:40 – *Using Wearable Fitness Trackers to Predict Intrapersonal Activity and Sleep Outcomes with Supervised Machine Learning*

Presenter: Emily Dittmer
Supervisor: Dr. Sayeh Bayat

1:50 – *Internal Calibration Analysis of Bone Mineral Density Loss in Intensive Care Unit Patients*

Presenter: Sarah Sloss
Supervisor: Dr. Sarah Manske

2:00 – *Machine Learning Analysis of Sporadic Inclusion Body Myositis Novel Biomarkers*

Presenter: Jenny Wei
Supervisor: Dr. May Choi

2:10 – *Candidate Gene Effects in Inflammatory Bowel Disease and Bones*

Presenter: Rachel Klassen
Supervisor: Dr. Steven Boyd and Dr. Cathy Lu

2:20 – 2:40: COFFEE/SNACK BREAK

Session 7 - Regenerative Medicine and Novel Medical Technologies (KNB 214)

Session Chair: Tiffany Dang

Judges: Justin Tse and Daphne Kaketsis

2:40 – *Effects of in vitro Ketamine Exposure on Synapse Formation, Neuronal Growth, and Learning*

Presenter: Badra Abbas

Supervisor: Dr. Naweed Syed

2:50 – *Brain Controlled Robot for Paralympic Sport*

Presenter: Morgan Kerr

Supervisor: Dr. Adam Kirton

3:00 – *The Role of Mesenchymal Stem Cells in Cartilage Regeneration*

Presenter: Dora Modrcin

Supervisor: Dr. Roman Krawetz

3:10 – *The Expansion of Human Umbilical Cord Mesenchymal Stromal Cells in Microcarrier-Based Suspension Bioreactors with In-House Prepared Serum-Free and Xenogeneic-Free Media*

Presenter: Emilie Gysel

Supervisor: Dr. Michael Kallos

3:20 – *Augmenting Brain-Computer Interfaces (BCI) for Children Through Computer Vision*

Presenter: Haden Scheirman

Supervisor: Dr. Adam Kirton

3:30 – *Effect of Protein Supplementation on the Isolation of Exosomes Derived from Cancer Cells*

Presenter: Heather Booth

Supervisor: Dr. Arindom Sen

3:40 – *Bioprocess Optimization for the Clinical-Scale Production of Human Skin-Derived Schwann Cells in Stirred-Suspension Bioreactors*

Presenter: Edward Melnyk

Supervisor: Dr. Michael Kallos

3:50 – *Evaluating the Performance of In-House Produced Growth Factors for the Culture of Human Induced Pluripotent Stem Cells in Vertical-Wheel Bioreactors*

Presenter: Jenna Holloway

Supervisor: Dr. Michael Kallos

Session 8 - Health Monitoring/Management and Precision Diagnostics (KNB 427)

Session Chair: Andrew Koshyk

Judges: Annie Bugbird and Isabella Vandergaag

2:40 – *Developing a Wearable Technology Intervention to Reduce Risk of Lower Back Pain Among Nurses*

Presenter: Rwan Abdelraouf (Zoom)

Supervisor: Dr. Linda Duffett-Leger

2:50 – *Development of Virtual Support Programs for Public Safety Personnel, Nurses, and their Families*

Presenter: Kayla Vickers (Zoom)

Supervisor: Dr. Linda Duffett-Leger

3:00 – *Building a Custom Bioinformatics Pipeline for Patients with Inborn Errors of Immunity*

Presenter: Benjamin Green

Supervisor: Dr. Ashish Marwaha

3:10 – *Cortisol Detecting Sensor: A Stress-Free Advancement in Disease Diagnosis and Management*

Presenter: Irvyne Aradanas

Supervisor: Dr. Richa Pandey

3:20 – *Access and Models of Care for OSA: A Cross-National Comparison of Canadian and Australian Quantitative Patient Survey Data*

Presenter: Duaa Fatima

Supervisor: Dr. Sachin Pendharkar

3:30 – *Preliminary Work Using Machine Learning to Discover Genetic Effects on Brain Aging in the UK Biobank*

Presenter: Emily Munro

Supervisor: Dr. Ethan MacDonald

3:40 – *Developing Smart-Traps to Observe Physiological Stress Responses in Wild-Caught Rodents*

Presenter: Chetan Gupta

Supervisor: Dr. Mathieu Pruvot

3:50 – *Investigation of Dielectric Probe Measurements with Hydration Changes in Beef Tissue*

Presenter: Ryan Baker

Supervisor: Dr. Elise Fear

4:00 – 4:15: SHORT BREAK

4:15 – 4:30: Closing Remarks, Announcements, and Awards Presentation