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.

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:

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### 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