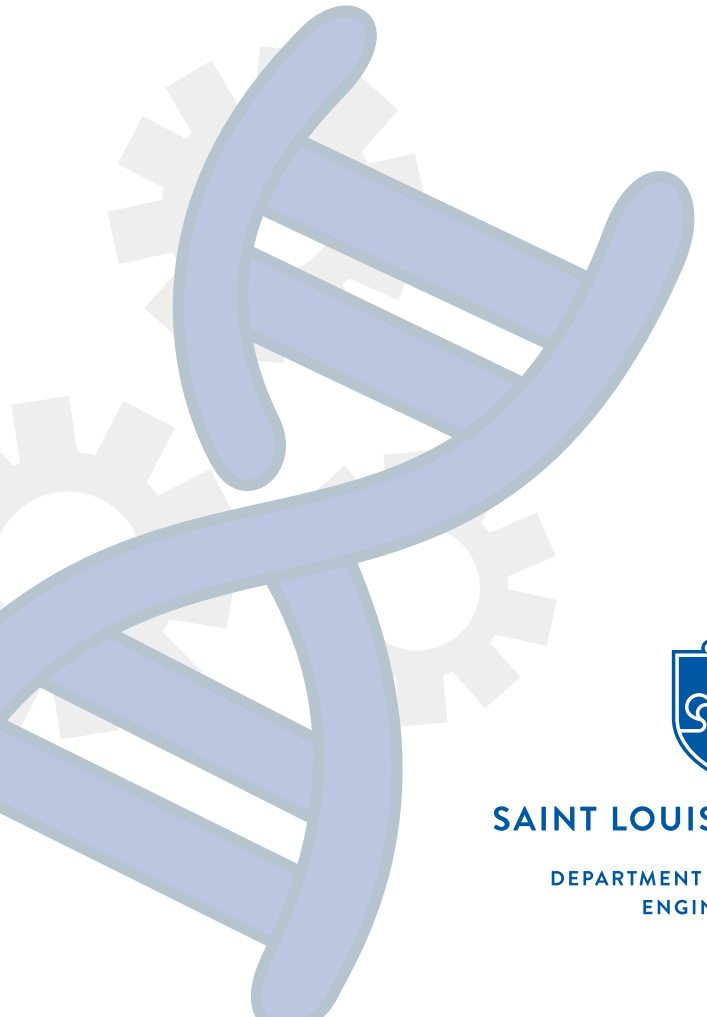
2023

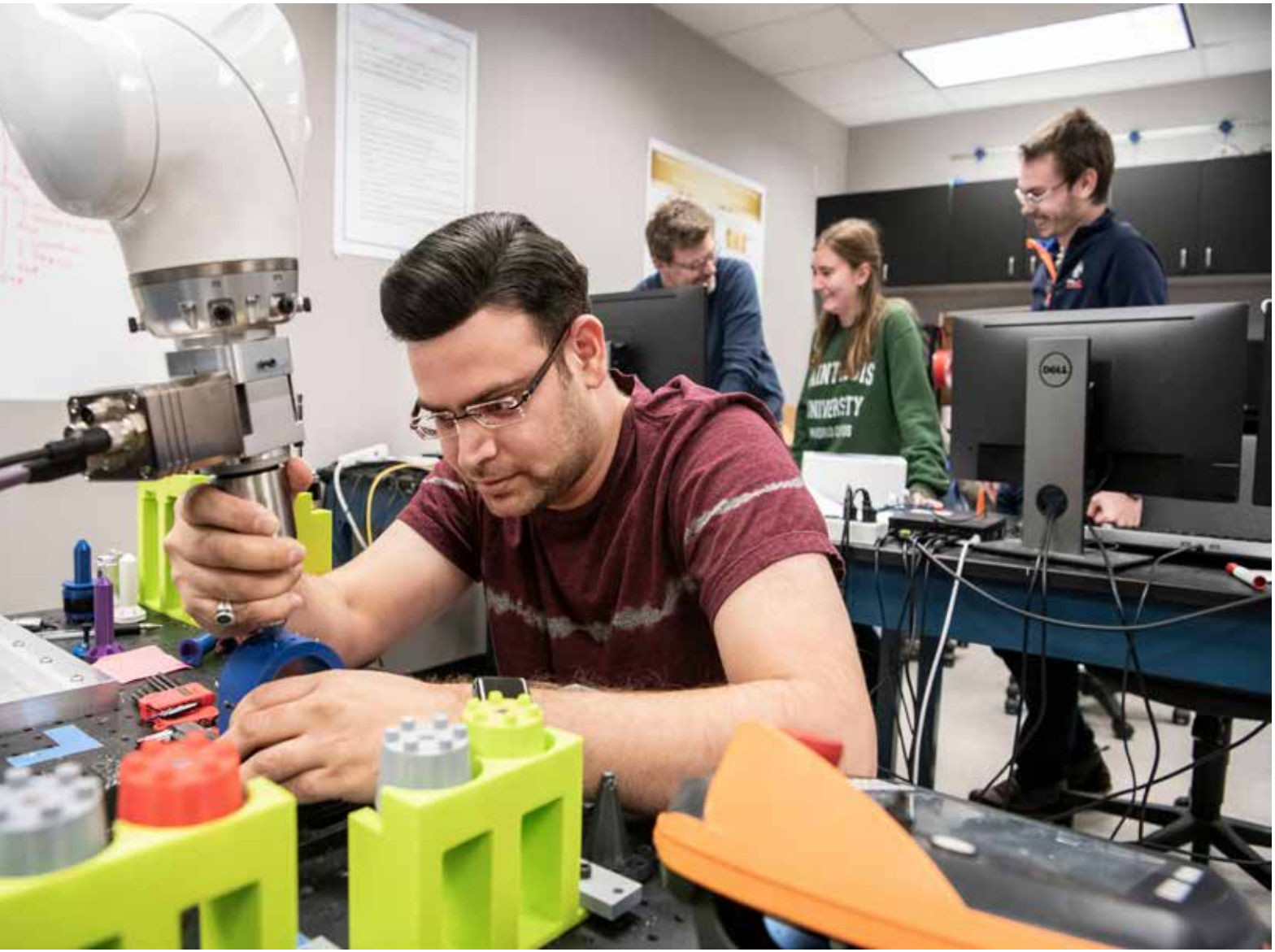
DEPARTMENT OF BIOMEDICAL ENGINEERING

FACULTY PROFILES



SAINT LOUIS UNIVERSITY

DEPARTMENT OF BIOMEDICAL ENGINEERING



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Research Faculty

Teaching Faculty

J. GARY BLEDSOE, PH.D.

Professor and Department Chair
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KEYWORDS

+ Biomechanics
+ Fracture Fixation
+ Biomaterials

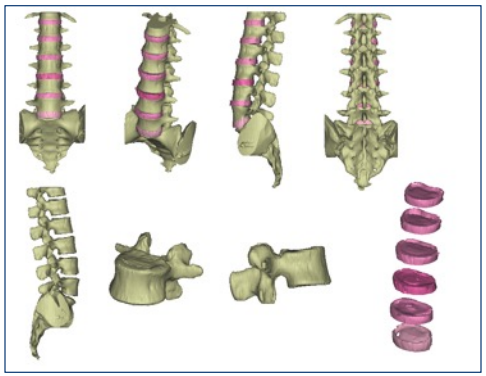
RESEARCH INTERESTS

+ Orthopaedic biomechanics
+ Trauma biomechanics
+ Orthopaedic tissue engineering
+ Biomechanical modeling
+ Biomaterials
+ Orthopedic surgery

HIGHLIGHTS

+ 2 patents under his name
+ Multiple publications
+ Long history of collaboration with Orthopedic Surgery
+ Member of BMES and ORS

Dr. Bledsoe's Interfacial Biomaterials/Biomechanics Lab focuses on those healing phenomena that typically occur at a tissue material interface. While we must consider the biocompatibility of the material, we must also consider device function which is often dependent on the mechanics of the interface. For example, a degenerated vertebral disc can be very painful, and treatment options are limited. Dr. Bledsoe is exploring options for providing mechanical support without generating a response to the material that causes other maladies.



NATASHA CASE, PH.D.

Assistant Professor
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KEYWORDS

+ Hydrogel Biomaterials
+ Drug Delivery, Spectroscopy
+ Transport in Complex Environments
+ Drug Screening
+ Cell-Matrix Interactions,
+ Glioblastoma Spheroid Models

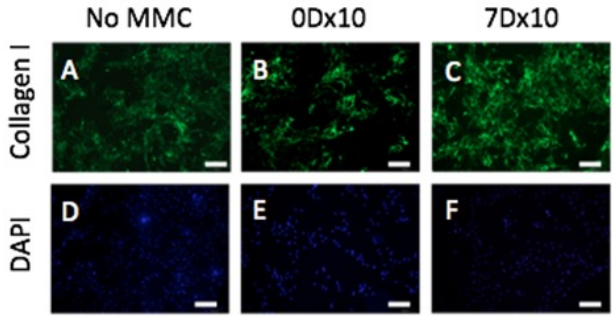
RESEARCH INTERESTS

+ Tissue biomechanics
+ Orthopaedic tissue development & matrix biology
+ Soft orthopaedic tissues and bone
+ Adult stem cells
+ Mechanical regulation of cells in orthopaedic tissues
+ Stem cell regulation by intrinsic and extrinsic cues

HIGHLIGHTS

+ Currently advising 4 graduate and 6 undergraduate students
+ Multiple publications and conference presentations
+ Member of ORS and BMES

Dr. Case's research focuses on how mechanical, biophysical, and biochemical stimuli interact to direct orthopaedic tissue development and adaptation, with the results of this work being used to optimize tissue engineering strategies. Tissue development studies are complemented by research on tissue biomechanics and mechanobiology. Her research aims to expand knowledge about structure-function relationships in orthopaedic tissues and to increase understanding about biophysical regulation of these tissues, with the long-term goal of enhancing repair strategies for orthopaedic tissues



YAN GAI, PH.D.

Associate Professor
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KEYWORDS

+ EEG
+ Speech
+ Brain-Computer Interface

RESEARCH INTERESTS

+ Brain-controlled wheelchairs for paralyzed patients
+ Smart cushions
+ Speech intelligibility
+ Mental states of airplane pilots

HIGHLIGHTS

+ Currently advising 4 graduate and 5 undergraduate students
+ 14 first-authored or corresponding-authored publications
+ A science-fiction writer with 1 novel and a short-story series

Dr. Gai and her neuroengineering lab have been dedicated to the cutting-edge technology of improving life quality of paralyzed or hearing-impaired patients. Her recent projects include brain-controlled wheelchairs, next-generation smart hearing aids, and infrared cochlear implants.

Fig. 1 Schematic of the brain-controlled wheelchair with virtual-space sound.

KOYAL GARG, PH.D.

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KEYWORDS

+ Skeletal muscle
+ Biomaterials
+ Stem Cells

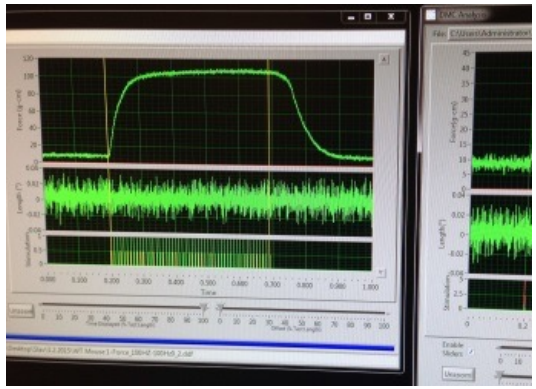
RESEARCH INTERESTS

+ Regeneration of skeletal muscle following volumetric muscle loss (VML) injuries
+ Muscle-bone cross talk following traumatic injuries
+ Rejuvenation of stem cells in aged skeletal muscle
+ Development of extracellular matrix (ECM) based biomaterials

HIGHLIGHTS

+ "Decellularized ECM scaffolds for improving skeletal muscle regeneration and functional recovery following volumetric muscle loss."
+ "Laminin-111 and electrical stimulation therapies for musculoskeletal injuries."
+ 26 peer-reviewed publications

Dr. Garg's research interests include cell and tissue engineering, extracellular matrix based biomaterials, stem cells, immune response, skeletal muscle and neuromuscular junctions. Aged or severely injured skeletal muscle is associated with reduced regenerative capacity and force production. The primary motive of Garg's research is to develop biomaterial and stem cell based therapies for improving the regenerative and functional capacity of skeletal muscle following injury, disease or aging.



ANDREW HALL, D.Sc.

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KEYWORDS

+ Medical Imaging
+ Medical Robotics
+ Image Guided Therapy
+ 3D Printing
+ Interventional Radiology

RESEARCH INTERESTS

+ Medical Imaging
+ Image Guided Interventions and Surgery
+ 3D Printing in Medicine
+ Surgical Robotics

HIGHLIGHTS

+ 27 years in industry R&D prior to SLU
+ Advising 3 MS and 3 undergraduate researchers
+ 18 Peer-reviewed publications
+ 15 Patents granted
+ Research grant from Siemens Medical
+ Research grant from Missouri ACC

Dr. Hall's research interests stem from his experience in medical imaging. He works with interventional radiologists to optimize pre-operative imaging protocols to support emerging minimally invasive procedures, such as prostate artery embolization. His lab is also working on image-guided robotic therapies for pedicle screw placement and laminectomy in the spine. His lab uses 3D printing extensively, including the development of 3D-printed objects with controllable radiopacity, and dissolvable 3D printed tissue molds derived from CT images. Finally, he works on the development of smart-phone based medical devices.

SCOTT A. SELL, PH.D.

Professor, Biomedical Engineering
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KEYWORDS

+ Tissue Engineering
+ Regenerative Medicine
+ Scaffold Fabrication
+ Electrospinning
+ Dermal Regeneration
+ Orthopedic Regeneration

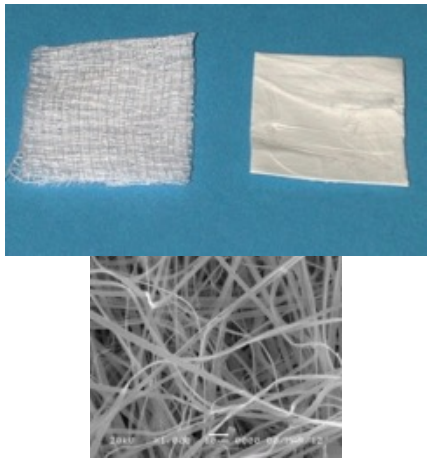
RESEARCH INTERESTS

+ The sustained release of platelet-rich plasma derived biomolecules to modify the local inflammatory response
+ The use of advanced electrospinning technologies to create structures conducive to cellular infiltration
+ Investigation of the potential use of Manuka honey in the treatment of chronic wounds
+ Dermal regeneration and tissue engineering scaffolds

HIGHLIGHTS

+ Dr. Sell is associated with the Tissue Engineering Scaffold Fabrication Laboratory
+ Published "The Influence of Platelet Rich Plasma on Myogenic Differentiation" in the Journal of Tissue Engineering and Regenerative Medicine in July 2013.

Dr. Sell conducts research in the areas of tissue engineering and regenerative medicine, particularly focusing on the potential for electrospinning to create extracellular matrix analogue scaffolds for dermal and musculoskeletal repair. He has also done extensive research on the incorporation and controlled release of platelet-rich plasma from electrospun scaffolds. Sell's research interests include tissue engineering, regenerative medicine, electrospinning, polymeric scaffolds, dermal regeneration, and ligament repair.



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KEYWORDS

+ Hydrogel Biomaterials
+ Drug Delivery, Spectroscopy
+ Transport in Complex Environments
+ Drug Screening
+ Cell-Matrix Interactions,
+ Glioblastoma Spheroid Models

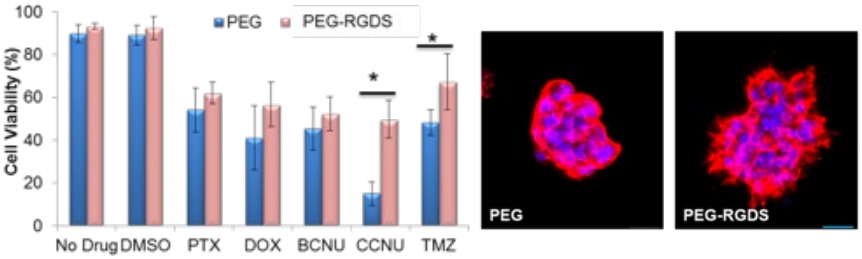
RESEARCH INTERESTS

+ Hydrogel Biomaterials
+ Drug Delivery
+ Spectroscopy
+ Transport in Complex Environments
+ Drug Screening
+ Cell-Matrix Interactions
+ Glioblastoma Spheroid Models

HIGHLIGHTS

+ More than 60 Publications and 4 Patents to her name
+ Frequent reviewer for >60 Scientific Journals
+ Reviewer for NIH, NSF, DoD Review Panels
+ Member of BMES, AIChE, SfB, and Sigma Xi

Dr. Zustiak's primary research interests are in hydrogel biomaterials and tissue engineering, with emphasis on developing novel biomaterials as cell scaffolds and drug screening platforms, and elucidating matrix structure-property relationships as well as cell-matrix interactions. Biomaterial-based models are crucial for bridging the gap between traditional tissue culture and animal models by providing a cell environment that closely mimics real tissue. This research is highly multidisciplinary, merging the fields of engineering, materials science, and biology.



MARTA COOPERSTEIN, PH.D.

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Dr. Cooperstein did her undergraduate and graduate research at the Center for Biomedical Engineering at the University of New Mexico where she researched fabrication and cytotoxicity of thermoresponsive substrates for tissue engineering. She also studied the mechanism of cell detachment from these substrates. She is a recipient of the highly competitive National Science Foundation Graduate Research Fellowship awarded to top U.S. graduate students.

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