

THE EXPERTS Robson Forensic

ASHUTOSH KHANDHA, Ph.D.
Biomedical Engineer/Biomechanics and
Bioengineering/Medical Devices

Investigates and analyzes biomechanical and biomedical injuries; injury causation; and medical equipment, devices, and implants.

Assesses Injuries: Applying physics, anatomy, and physiology, assesses injuries involving:

- Traumatic brain injuries and skull fractures
- Maxillofacial trauma
- Neck, back and spinal cord injuries
- Orthopedic and neurologic injuries
- Vascular ruptures
- Abdominal organs
- Heart, lungs, skin (including burns) and other organs.
- Musculo-skeletal injuries including joints (i.e., shoulders, knees, ankles, and elbows), soft tissues (i.e., rotator cuff, tendons, and ligaments), and fracture patterns (torso, long bone, hand, foot, or skull).

Determines Cause: Applying engineering principles, determines:

- The manner in which tissue failed: the type of loading, the direction of loading and magnitude or size of the load that caused the injury.
- If injury patterns are causally related or consistent with the hazardous condition or circumstances claimed.
- Whether there was sufficient force in the right direction to cause an injury.
- The presence of pre-existing conditions and how they affect the injury.
- Who and/or what action contributed to the injuries.
- What could have been done to prevent the injuries.

Typical Personal Injury Cases Involve:

- Motor vehicle collisions.
- Slips, trips, and falls.
- Medical device failures.
- Occupational and workplace injuries.
- Sports and recreational injuries.

PROFESSIONAL EXPERIENCE

2023 to Present **Robson Forensic, Inc.**
Associate

Provide technical investigations, analysis, reports, and testimony toward the resolution of personal injury litigation involving injury analysis and causation, medical equipment, medical devices, and procedures.

ASHUTOSH KHANDHA, Ph.D.
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Bioengineering/Medical Devices

2012 to Present	University of Delaware <i>Adjunct Professor</i> <i>Assistant Professor, Biomedical Engineering</i> <i>Assistant Professor, Biomechanics and Movement Science</i> Conducted biomechanical, electromyography based neuromusculoskeletal gait analysis for healthy individuals and individuals with knee ligament injuries and surgical reconstruction.	<i>2023-present</i> <i>2018-2023</i> <i>2017-2023</i>
	Implemented magnetic resonance imaging (MRI) based protocols for early detection of osteoarthritis (OA) in an institutional review board (IRB) approved human study.	
	Investigated the link between biomechanical and biochemical alterations in the knee cartilage after surgery.	
	<i>Director, Biomedical Engineering, Corporate and Clinical Outreach</i> Fostered department collaborations with clinical, business, and medical communities.	<i>2019-2023</i>
	Supported local community by recruiting undergraduate engineering design projects to solve unmet needs.	
	Organized and supported alumni networking and mentoring events.	
	Collaborated with high schools to create and execute innovative educational outreach programs.	
	<i>Co-chair, Biomedical Engineering, Communications Committee</i> Coordinated communication efforts for a public audience and recruitment.	<i>2018-2023</i>
	<i>Associate Scientist, Delaware Rehabilitation Institute (DRI)</i> Led and supported efforts for human clinical trials and biomedical research, including design of institutional review board (IRB) protocols, data collection and management.	<i>2017-2018</i>
	<i>Postdoctoral Researcher</i> Evaluated injury and disease in the knee joint using radiography (X-ray).	<i>2016</i>
	<i>Research Assistant</i> Conducted gait analysis and neuromusculoskeletal modeling of subjects with knee injuries.	<i>2012-2016</i>
	<i>Teaching Assistant</i> Worked as a teaching assistant for one course: Bioengineering Mechanics.	<i>2012-2013</i>

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- 2010 to 2011 **Engineering Center for Orthopaedic Research Excellence (E-CORE)
University of Toledo**
Research and Teaching Assistant
Conducted computer aided design (CAD), cadaveric testing and finite element analysis (FEA) of orthopedic implants.
- Worked as a teaching assistant for two courses: Introduction to Bioengineering and Computer Applications in Bioengineering.
- 2004 to 2010 **Applied Spine**
Director of Biomechanical Research 2008-2010
Designed, developed, and tested spinal fusion implants complementing dynamic stabilization.
- Assisted with execution of a clinical study for U.S. Food and Drug Administration (FDA) premarket approval (PMA) of a class III medical device.
- Research and Quality Assurance (QA) Engineer* 2004-2008
Designed and executed biomechanical and material testing protocols for dynamic stabilization spinal implants.
- Conducted verification and validation (V&V) activities and failure mode, effects, and criticality analysis (FMECA) for a dynamic stabilization spinal implant.
- 2002 to 2004 **University of Toledo**
Research and Teaching Assistant
Conducted material testing, cadaveric testing, and finite element analysis (FEA) of spinal fusion implants and surgical techniques.
- Teaching assistant for three courses: Computational Biomechanics, Advanced Biomechanics, and Introduction to C++.
- 2001 to 2002 **Stream Tracmail**
Customer Support Engineer
Technical assistance for issues related to desktops and peripherals.
- 2000 to 2001 **Life Care**
Customer Support Engineer
Clinical training and support for dental implant systems.

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TEACHING EXPERIENCE

2023 **Readings in Movement Science**

BMSC 622, Biomechanics and Movement Science, University of Delaware
Co-instructor for course that focuses on critical literature evaluation of peer-reviewed publications in biomechanics and movement science.

2019- **Medical Device Development**

2023 BMEG464, Biomedical Engineering, University of Delaware
Primary instructor for course that focuses on design, development, approval, and failure analysis of medical devices per U.S. Food and Drug Administration (FDA) processes. Devices include insulin pumps, intraocular lenses, vascular staplers, duodenoscopes, dental implants, spinal implants, surgical robotics, resorbable fixation systems, ultrasound devices, and pacemakers.

2020- **Circuits, Signals and Systems for Biomedical Applications**

2023 BMEG230, Biomedical Engineering, University of Delaware
Primary instructor for course that focuses on the principles of direct current (DC) and alternating current (AC) circuits, as well as mathematical transform techniques applied to biomedical circuits, signals, and systems.

2019, **Biomedical Engineering Junior Design**

2022- BMEG360, Biomedical Engineering, University of Delaware
2023 Primary instructor for course that focuses on prototype development using the bio-design process.

2018- **Introduction to Medical Imaging Systems**

2022 BMEG479/BMEG679, Biomedical Engineering, University of Delaware
Primary instructor for course that focuses on clinical imaging modalities including radiography (X-ray), ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET) and single photon emission computed tomography (SPECT).

2018- **Interdisciplinary Engineering Senior Design**

2022 BMEG460/MEEG401, Biomedical and Mechanical Engineering, University of Delaware
Primary instructor for capstone course that focuses on customer requirement discovery, conceptualization, design, development, and testing of a proof-of-concept prototype.

2022 **Access: Ability Senior Project**

DIST 400, Discovery Learning Experience, University of Delaware
Co-instructor for course that involves structured independent research or service-learning experience focused on disability.

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2019- **Bioengineering Mechanics II**

2021 BMEG311, Biomedical Engineering, University of Delaware
Primary instructor for course that focuses on the topics of statics as well as particle and rigid body kinematics and kinetics, impulse, momentum, energy, and viscoelasticity, with application to biomedical problems.

2018 **Biomedical Instrumentation**

BMEG330, Biomedical Engineering, University of Delaware
Co-instructor for course that focuses on the introduction and application mechanical, chemical, electrical, and biological principles for biomedical measurements and instrumentation.

2018 **Biomedical Modeling and Simulation**

BMEG340, Biomedical Engineering, University of Delaware
Co-instructor for course that focuses on mathematical modeling and simulation of biomedical processes and experiments.

PROFESSIONAL CREDENTIALS

Good Clinical Practice (GCP), Collaborative Institutional Training Initiative (CITI),
expires December 10, 2023

PROFESSIONAL MEMBERSHIPS

American Society for Engineering Education (ASEE), Member
Biomedical Engineering Society (BMES), Member

EDUCATION

Ph.D., Biomedical Engineering, University of Delaware, Newark, Delaware, 2016
M.S., Bioengineering, University of Toledo, Toledo, Ohio, 2004
B.E., Biomedical Engineering, DJSCE, University of Mumbai, Maharashtra, India, 2001

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BOOK CHAPTERS

- 2020 **Khandha A**, Serhan J, Goel V. (2020) Design rationale for posterior dynamic stabilization relevant for spine surgery. Handbook of Spine Technology, Chapter 13, Springer Cham. pp. 293-314
- 2005 Goel V, **Khandha A**, Vadapalli S. (2005) Musculoskeletal biomechanics, an overview. Orthopaedic Knowledge Update 8, Chapter 4, American Academy of Orthopaedic Surgeons pp. 39-56

REFEREED JOURNAL PUBLICATIONS

- 2023 Su A, **Khandha A**, Bansal S, Ty JM, Baldys A, French ZP, Puccinelli JP. (2023) Orthopaedics and biomedical engineering design: an innovative duet toward a better tomorrow. Journal of the Pediatric Orthopaedic Society of North America 5(2)
- Williams JR, Neal K, Alfayyadh A, Capin JJ, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS (2023) Patellofemoral contact forces and knee gait mechanics 3 months after ACL reconstruction are associated with cartilage degradation 24 months after surgery. Osteoarthritis and Cartilage 1 pp.96-105
- 2022 Alfayyadh A, Neal K, Williams JR, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2022) Limb and sex related differences in knee muscle co-contractions exist 3 months after anterior cruciate ligament reconstruction. Journal of Electromyography and Kinesiology (accepted, in production)
- Ito N, Capin JJ, **Khandha A**, Buchanan TS, Silbernagel K, Snyder-Mackler L. (2022) Bone - patellar tendon - bone autograft harvest prolongs extensor latency during gait two years after ACLR. Journal of Medicine & Science in Sports & Exercise v.54(12) pp. 2109-2117
- Kiapour A, **Khandha A**, Massaad E, Connolly I, Hadzipasic M, Shankar GM, Goel VK, Shin JH. (2022) Effects of rod diameter on kinematics of posterior cervical spine instrumented constructs: an ex vivo study. Journal of Neurosurgery v.37(5) pp. 749-757
- Williams JR, Neal K, Alfayyadh A, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2022) Patellofemoral contact forces after ACL reconstruction: a longitudinal study. Journal of Biomechanics (accepted, in production)
- Ito N, Capin JJ, **Khandha A**, Buchanan TS, Snyder-Mackler L. (2022) Identifying gait pathology after ACL reconstruction using temporal characteristics of kinetics and electromyography. Journal of Medicine & Science in Sports & Exercise v.54(6) pp. 923-930

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- Neal K, Williams JR, Alfayyadh A, Capin JJ, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2022) Knee joint biomechanics during gait improve from 3 to 6 months after anterior cruciate ligament reconstruction. *Journal of Orthopaedic Research* v.40(9) pp. 2025-2038
- Williams JR, Neal K, Alfayyadh A, Lennon K, Capin JJ, **Khandha A**, Manal K, Potter HG, Snyder-Mackler L, Buchanan TS. (2022) Knee cartilage T2 relaxation times 3 months after ACL reconstruction are associated with knee gait variables linked to knee osteoarthritis. *Journal of Orthopaedic Research* v.40(1) pp. 252-259
- Ito N, Capin JJ, Arhos E, **Khandha A**, Buchanan TS, Snyder-Mackler L. (2021) Sex and mechanism of injury influence joint loading symmetry during gait 6 months after ACLR. *Journal of Orthopaedic Research* v.39 (5) pp. 1123-1132
- Wellsandt E, **Khandha A**, Capin JJ, Buchanan TS, Snyder-Mackler L. (2020) Operative and non-operative management of anterior cruciate ligament injury: differences in gait biomechanics at 5 years. *Journal of Orthopaedic Research* v.38 (12) pp. 2675-2684
- 2021 Ito N, Capin JJ, Arhos E, **Khandha A**, Buchanan TS, Snyder-Mackler L. (2021) Sex and mechanism of injury influence joint loading symmetry during gait 6 months after ACLR. *Journal of Orthopaedic Research* v.39 (5) pp. 1123-1132
- 2020 Wellsandt E, **Khandha A**, Capin JJ, Buchanan TS, Snyder-Mackler L. (2020) Operative and non-operative management of anterior cruciate ligament injury: differences in gait biomechanics at 5 years. *Journal of Orthopaedic Research* v.38 (12) pp. 2675-2684
- Capin JJ, Williams JR, Neal K, **Khandha A**, Durkee L, Ito N, Stefanik JJ, Snyder-Mackler L, Buchanan TS. (2020) Slower walking speed is related to early femoral trochlear cartilage degradation after ACL reconstruction. *Journal of Orthopaedic Research* v.38 (3) pp.645-652
- 2019 **Khandha A**, Manal K, Wellsandt E, Marmon A, Capin JJ, Snyder-Mackler L, Buchanan TS. (2019) High muscle co-contraction does not result in high joint forces during gait in anterior cruciate ligament deficient knees. *Journal of Orthopaedic Research* v.37(1) pp.104-112
- Capin JJ, **Khandha A**, Buchanan TS, Snyder-Mackler L. (2019) Partial medial meniscectomy leads to altered walking mechanics two years after anterior cruciate ligament reconstruction; meniscal repair does not. *Gait and Posture* v.74 pp. 87-93
- Capin JJ, Zarzycki R, Ito N, **Khandha A**, Dix C, Manal K, Buchanan TS, Snyder-Mackler L. (2019) Gait mechanics in women of the ACL-SPORTS randomized control trial: interlimb symmetry improves over time regardless of treatment group. *Journal of Orthopaedic Research* v.37(8) pp.1743-1793

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- 2018 Capin JJ, **Khandha A**, Zarzycki R, Arundale AJH, Ziegler ML, Manal K, Buchanan TS, Snyder-Mackler L. (2018) Gait mechanics and tibiofemoral loading in men of the ACL-SPORTS randomized control trial. *Journal of Orthopaedic Research* 36(9) pp.2364-2372
- Capin JJ, **Khandha A**, Zarzycki R, Manal K, Buchanan TS, Snyder-Mackler L. (2018) Gait mechanics after ACL reconstruction differ according to medial meniscal treatment. *Journal of Bone and Joint Surgery* 100(14) pp.1209-1216
- 2017 **Khandha A**, Manal K, Wellsandt E, Capin JJ, Snyder-Mackler L, Buchanan TS. (2017) Gait mechanics in those with/without medial compartment knee osteoarthritis five years after anterior cruciate ligament reconstruction. Special Issue: Injury and Post-Traumatic Osteoarthritis, *Journal of Orthopaedic Research* 35(3) pp.625-633
- Wellsandt E, **Khandha A**, Manal K, Axe MJ, Buchanan TS, Snyder-Mackler L. (2017) Predictors of knee joint loading after anterior cruciate ligament reconstruction. Special Issue: Injury and Post-Traumatic Osteoarthritis, *Journal of Orthopaedic Research* 35(3) pp.651-656
- Capin JJ, **Khandha A**, Zarzycki R, Manal K, Buchanan TS, Snyder-Mackler L. (2017) Gait mechanics and second ACL rupture: implications for delaying return-to-sport. *Journal of Orthopaedic Research* 35(9) pp.1894-1901. Excellence in Clinical Science Award
- 2016 Robbins AK, Mateson AB, **Khandha A**, Pugarelli JE, Buchanan TS, Akins RE, Barthold JS. (2016) Fetal rat gubernaculum mesenchymal cells adopt myogenic and myofibroblast-like phenotypes. *The Journal of Urology* 196(1) pp.270-278
- 2008 Hallab N, **Khandha A**, Malcolmson G, Timm J. (2008) In vitro assessment of serum-saline ratios for fluid simulator testing of highly modular spinal implants with articulating surfaces. *International Journal of Spine Surgery* 2(4) pp.171-183
- 2007 Bono C, **Khandha A**, Vadapalli S, Holekamp S, Goel V, Garfin S. (2007) Residual sagittal motion after lumbar fusion: a finite element analysis with implications on radiographic flexion-extension criteria. *Spine* 32(4) pp. 417-422
- 2006 Vadapalli S, Sairyo K, Goel V, Robon M, Biyani A, **Khandha A**, Ebraheim N. (2006) Biomechanical rationale for using polyetheretherketone (PEEK) spacers for lumbar interbody fusion – a finite element study. *Spine* 31(26) pp. E992-E998
- Vadapalli S, Robon M, Biyani A, Sairyo K, **Khandha A**, Goel V. (2006) Effect of lumbar interbody cage geometry on construct stability – a cadaveric study. *Spine* 31(19) pp. 2189-2194

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REFEREED PODIUM PRESENTATIONS AND INVITED TALKS

2022 Williams JR, Neal K, Alfayyadh A, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2022) Tri-compartment knee loading 3 months after ACL reconstruction. Proceedings of the Summer Biomechanics, Bioengineering and Biotransport Conference (SB3C): Cambridge, MD, US

Neal K, Williams JR, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2022) Knee cartilage stresses in medial femoral cartilage 6 months after ACL reconstruction: a finite element analysis. Proceedings of the North American Congress on Biomechanics: Ottawa, Canada

Williams JR, Neal K, Alfayyadh A, Capin JJ, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2022) Patellofemoral knee mechanics 3 months after ACL reconstruction are associated with markers of patellofemoral cartilage degradation 24 months after surgery. Proceedings of the North American Congress on Biomechanics: Ottawa, Canada. Nominated for ASB Clinical Biomechanics Award

Williams JR, Neal K, Alfayyadh A, Capin JJ, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2022) Is persistent loading symmetry after ACL reconstruction the key to maintaining long term cartilage health? Proceedings of the Orthopedic Research Society: Tampa, FL, US

Alfayyadh A, Neal K, Williams JR, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2022) Higher knee muscle co-contractions are observed in individuals exhibiting loading asymmetry 3-months after ACL reconstruction. APTA Combined Sections Meeting: San Antonio, TX, US

2021 Neal K, Williams JR, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2021) Change in knee cartilage stresses from 6 to 24 months after ACLR: a preliminary analysis. Proceedings of the American Society of Biomechanics: Atlanta GA/virtual meeting

Williams JR, Neal K, Alfayyadh A, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2021) Patellofemoral contact forces after ACL reconstruction using statistical parametric mapping. Proceedings of the International Society of Biomechanics: Stockholm, Sweden

Lennon K, Williams JR, Alfayyadh A, Neal K, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2021) Change in KOOS QOL score from 3 to 6 months after ACLR does not predict long term cartilage health. APTA Combined Sections Meeting: Orlando, FL, US

2020 Williams JR, Neal K, **Khandha A**, Potter HG, Snyder-Mackler L, Buchanan TS. (2020) Osteoarthritic biochemical changes in tibiofemoral cartilage are detectable 6 months after anterior cruciate ligament reconstruction. Proceedings of the Orthopedic Research Society: Phoenix, AZ, US

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2019 Capin JJ, **Khandha A**, Williams JR, Durkee L, Neal K, Stefanik J, Snyder-Mackler L, Buchanan TS. (2019) Quadriceps forces during gait 3 months after ACL reconstruction predict 6-month trochlear cartilage T2 relaxation. Proceedings of the International Society of Biomechanics: Calgary, Canada

Arhos EK, Capin JJ, **Khandha A**, Buchanan TS, Snyder-Mackler L. (2019) Quadriceps strength does not modify gait mechanics after ACL reconstruction, rehabilitation and return to sport training. Proceedings of the International Society of Biomechanics: Calgary, Canada

Naoaki I, Capin J, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2019) The effect of mechanism of injury on gait mechanics, tibiofemoral loading, and response to post-operative return-to-sport (RTS) training in male athletes after ACL reconstruction (ACLR). APTA Combined Sections Meeting: Washington, DC, US

2018 **Khandha A**, Capin J, Williams JR, Manal K, Snyder-Mackler L, Buchanan TS. (2018) Correlation between inter-limb differences in knee biomechanical and biochemical variables 3 and 6 months after anterior cruciate ligament reconstruction. Proceedings of the World Congress of Biomechanics: Dublin, Ireland

Williams JR, **Khandha A**, Neal K, Snyder-Mackler L, Buchanan TS. (2018) Minimum inter-limb difference of tri-compartment knee cartilage T2 values in healthy subjects. Proceedings of the World Congress of Biomechanics: Dublin, Ireland

Capin J, **Khandha A**, Zarzycki R, Arundale A, Ziegler ML, Manal K, Buchanan TS, Snyder-Mackler L (2018) Gait mechanics and tibiofemoral loading in men of the ACL-SPORTS randomized control trial. Proceedings of the Osteoarthritis Research Society International: Liverpool, UK

Bonner B, Capin J, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2018) Patient reported outcomes and frontal plane knee biomechanics improve between 3 and 6 months after ACL reconstruction, but sagittal plane asymmetries do not improve. APTA Combined Sections Meeting: New Orleans, LA, US

2017 **Khandha A**, Manal K, Capin J, McGinnis K, Snyder-Mackler L, Buchanan TS. (2017) Inter-limb differences in knee gait and quantitative magnetic resonance imaging variables 3 months after anterior cruciate ligament reconstruction. Summer Biomechanics, Bioengineering and Biotransport Conference (SB3C): Tucson, AZ, US

Khandha A, Manal K, Capin J, McGinnis K, Snyder-Mackler L, Buchanan TS. (2017) Relationship between inter-limb differences in knee gait and cartilage T2 variables 3 months after anterior cruciate ligament reconstruction. International Society of Biomechanics: Brisbane, Australia

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- 2016 **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2016) Knee medial tibial cartilage stress one and five years after anterior cruciate ligament reconstruction. Summer Biomechanics, Bioengineering and Biotransport Conference (SB3C): National Harbor, MD, US
- 2015 **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2015) Kinematic/kinetic differences between subjects with/without knee osteoarthritis after unilateral anterior cruciate ligament reconstruction, and the influence on stress distribution. American Society of Biomechanics: Columbus, OH, US
- Wellsandt E, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2015) Relationship of biomechanical and EMG factors to joint contact forces and early knee OA after ACL reconstruction. Orthopedic Research Society: Las Vegas, NV, US
- 2014 **Khandha A**, Gardinier E, Capin J, Manal K, Snyder-Mackler L, Buchanan TS. (2014) Peak medial compartment contact forces in the knee after anterior cruciate ligament reconstruction – five-year follow-up. Annual Biomechanics Research Symposium: Newark, DE, US
- 2010 Castellvi A, **Khandha A**, Ferrara L, Anand N, Cheng J, Yonemura K, Robie B. (2010) Analysis of preop/postop motion of Stabilimax. Annual Preservation of Motion Meeting: Duck Key, FL, US
- Kitchel S, Wharton N, **Khandha A**. (2010) Clinical assessment of adjacent level effects (ALE) induced by Stabilimax lumbar posterior dynamic stabilization (PDS) implant through measurement of range of motion (ROM) and interpedicular travel (IPT). Spine Arthroplasty Society: New Orleans, LA, US
- 2007 Hallab N, **Khandha A**, Malcolmson G, Timm J. (2007) Wear from a spinal stabilization implant with metal-on-metal articulating bearings dramatically depends on type of simulator fluid. Spine Arthroplasty Society: Berlin, Germany
- 2004 Goel V, Matyas A, Vadapalli S, **Khandha A**, Navarro R, Biyani A, Cameron B. (2004) Kinematics of a metal-on-polymer disc vs. a telemeterized natural motion elastomer disc (TNMED) – a finite element study. European Society of Biomechanics: S-Hertogenbosch, The Netherlands
- 2003 **Khandha A**, Vadapalli S, Holekamp S, Goel V, Bono C, Garfin S. (2003) Quantifying motion across a solid lumbar interbody fusion using a finite element model. American Society of Mechanical Engineers International Mechanical Engineering Congress and Exposition, Advances in Bioengineering: Washington, DC, US

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REFEREED POSTER PRESENTATIONS AT SCIENTIFIC MEETINGS

- 2023 Alfayyadh A, Williams JR, Neal K, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2023) Knee muscle co-contraction imbalance may contribute to medial compartment underloading early after ACL reconstruction. APTA Combined Sections Meeting: San Diego, CA, US
- 2022 Alfayyadh A, Neal K, Williams JR, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2022) Individuals with medial compartment underloading 6-months after anterior cruciate ligament reconstruction walk with asymmetric knee muscle co-contraction. Proceedings of the North American Congress on Biomechanics: Ottawa, Canada
- Ito N, Capin J, **Khandha A**, Buchanan TS, Snyder-Mackler L, Silbernagel K. (2022) Patients 6 months after ACL reconstruction load their involved knees at slower rates compared to their uninvolved knees during gait. Proceedings of the European Society for Sports Traumatology, Knee Surgery and Arthroscopy: Paris, France
- Neal K, Williams JR, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2022) Changes in stress distributions after ACL reconstruction: a preliminary longitudinal finite element analysis. Proceedings of the Orthopedic Research Society: Tampa, FL, US
- 2021 **Khandha A**, Chajes M. (2021) Engaging honors students in meaningful outreach activities during COVID times. Proceedings of the Biomedical Engineering Society: Orlando FL, US
- Williams JR, Neal K, Alfayyadh A, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2021) Is patellofemoral underloading 6 months after ACL reconstruction leading to OA development? Proceedings of the American Society of Biomechanics: Atlanta GA/virtual meeting
- Williams JR, Neal K, Alfayyadh A, Fisher L, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2021) Asymmetries in patellofemoral contact forces 3 months after ACL reconstruction differ by graft type. Proceedings of the Orthopedic Research Society: Long Beach, CA
- Alfayyadh A, Williams JR, Neal K, Lennon K, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2021) Co-contraction of quadriceps and gastrocnemius muscles are associated with tibiofemoral cartilage deterioration 3-months after ACLR. Proceedings of the Orthopedic Research Society: Long Beach, CA
- Neal K, Williams JR, Alfayyadh A, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2021) Uninjured knee is a stable control for modeling variables 3 to 6 months after anterior cruciate ligament reconstruction. Proceedings of the Orthopedic Research Society: Long Beach, CA

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- 2020 Neal K, Williams JR, Alfayyadh A, Ito N, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2020) Knee biomechanical asymmetries improve from 3 to 6 months after ACLR but continue to persist at 6 months. Proceedings of the American Society of Biomechanics: Atlanta GA
- Alfayyadh A, Ito N, Neal K, Williams JR, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2020) Women walk with higher muscle co-contraction indices 3 months after anterior cruciate ligament reconstruction. Proceedings of the American Society of Biomechanics: Atlanta GA
- Williams JR, Neal K, Fisher L, Alfayyadh A, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2020) Asymmetries in patellofemoral gait mechanics are detectable 3 months after ACL reconstruction. Proceedings of the American Society of Biomechanics: Atlanta GA
- Williams JR, Neal K, Alfayyadh A, Capin JJ, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2020) Early loading asymmetries may be at the root of eventual knee osteoarthritis development after anterior cruciate ligament reconstruction. Proceedings of the Osteoarthritis Research Society International: Vienna, Austria
- Neal K, Williams JR, Alfayyadh A, Capin JJ, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2020) Asymmetries in peak knee adduction moment 3 months after ACL reconstruction associated with worse cartilage health 6 months after surgery. Proceedings of the Osteoarthritis Research Society International: Vienna, Austria
- Neal K, Williams JR, Ito N, Capin JJ, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2020) Do asymmetric gait patterns three months after anterior cruciate ligament reconstruction cause abnormal knee joint loading? Proceedings of the European Society of Sports Traumatology, Knee Surgery and Arthroscopy: Milan, Italy
- Williams JR, Neal K, Lennon K, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2020) Involved limb medial compartment loading 3 months after ACL reconstruction associated with worse cartilage health 6 months after surgery. Proceedings of the European Society of Sports Traumatology, Knee Surgery and Arthroscopy: Milan, Italy
- Neal K, Williams JR, Ito N, Capin J, **Khandha A**, Manal K, Snyder-Mackler L, Buchanan TS. (2020) The effects of ACL reconstruction on knee biomechanics three months after surgery. Proceedings of the Orthopedic Research Society: Phoenix, AZ, US
- Lennon K, Williams JR, Neal K, **Khandha A**, Buchanan TS, Snyder-Mackler L. (2020) Deep cartilage quantitative MRI asymmetries post ACL reconstruction may provide insight to early osteoarthritis development. APTA Combined Sections Meeting: Denver, CO, US

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Biomedical Engineer/Biomechanics and
Bioengineering/Medical Devices

- 2019 Neal K, Williams JR, **Khandha A**, Capin J, Snyder-Mackler L, Buchanan TS. (2019) Comparison of involved and uninvolved limb knee cartilage T2 Values 24 months after anterior cruciate ligament reconstruction. Proceedings of the International Society of Biomechanics: Calgary, Canada
- Williams JR, Neal K, Capin J, **Khandha A**, Snyder-Mackler L, Buchanan TS. (2019) Medial compartment loading 3 months following anterior cruciate ligament reconstruction is associated with cartilage glycosaminoglycan content 24-months after surgery. Proceedings of the International Society of Biomechanics: Calgary, Canada
- Faux-Dugan L, Williams JR, Neal K, **Khandha A**, Buchanan TS. (2019) Evaluating collagen matrix degradation after ACL reconstruction using quantitative MRI. American Society of Sports Medicine – Annual Meeting: Orlando, FL, US
- Capin JJ, Williams JR, **Khandha A**, Stefanik J, Neal K, Manal K, Snyder-Mackler L, Buchanan TS. (2019) Interlimb differences in trochlear T2 relaxation times and gait mechanics occur early after ACL reconstruction. Proceedings of the Orthopedic Research Society: Austin, TX, US
- Neal K, Williams JR, **Khandha A**, Capin JJ, Snyder-Mackler L, Buchanan TS. (2019) Comparison of gait asymmetries and quantitative MRI variables in patellar cartilage 6-months post ACL reconstruction. Proceedings of the Orthopedic Research Society: Austin, TX, US
- Williams JR, Neal K, **Khandha A**, Potter HG, Snyder-Mackler L, Buchanan TS. (2019) Are early inter-limb differences of knee cartilage T2 relaxation times predictive signs of early osteoarthritis development following anterior cruciate ligament reconstruction. Proceedings of the Orthopedic Research Society: Austin, TX, US
- Capin JJ, Thoma L, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2019) Response of gait mechanics to return-to-sports training after ACL reconstruction based on medial meniscus treatment. Proceedings of the Orthopedic Research Society: Austin, TX, US
- Capin J, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2019) Gait mechanics differ two years after anterior cruciate ligament reconstruction based on medial meniscus treatment. American Academy of Orthopaedic Surgeons: Las Vegas, NV, US
- 2018 Martin RM, Neal K, Williams JR, **Khandha A**, Buchanan TS. (2018) Regional quantification of knee articular cartilage degradation following ACL reconstruction. Biomedical Engineering Society: Atlanta, GA, US
- Faux-Dugan L, Williams JR, Neal K, **Khandha A**, Buchanan TS. (2018) Evaluating collagen matrix degradation after ACL reconstruction using quantitative MRI. Mid-Atlantic Regional Chapter - American Society of Sports Medicine: Harrisburg, PA, US

ASHUTOSH KHANDHA, Ph.D.
Biomedical Engineer/Biomechanics and
Bioengineering/Medical Devices

- Johnson J, Capin J, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2018) Gait biomechanics early after ACLR do not predict medial compartment joint space width 5 years after ACLR. American Society of Biomechanics: Rochester, MN, US
- Naoaki I, Capin J, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2018) Sex and mechanism of injury (MOI) influence knee mechanics after anterior cruciate ligament reconstruction (ACLR). American Society of Biomechanics: Rochester, MN, US
- Neal K, Williams JR, **Khandha A**, Buchanan TS. (2018) Comparison of knee biochemical variables in involved and uninvolved knees 6 months post anterior cruciate ligament reconstruction (ACLR). American Society of Biomechanics: Rochester, MN, US
- Khandha A**, Capin J, Williams JR, Manal K, Snyder-Mackler L, Buchanan TS. (2018) Knee biomechanical and biochemical variables early after anterior cruciate ligament reconstruction. Proceedings of the Orthopedic Research Society: New Orleans, LA, US
- 2017 **Khandha A**, Capin J, McGinnis K, Manal K, Snyder-Mackler L, Buchanan TS. (2017) Knee biomechanical and quantitative magnetic resonance imaging variables three months after anterior cruciate ligament reconstruction. Proceedings of the Osteoarthritis Research Society International: Las Vegas, NV, US
- Khandha A**, Capin J, McGinnis K, Manal K, Snyder-Mackler L, Buchanan TS. (2017) Knee gait and quantitative cartilage imaging variables after anterior cruciate ligament reconstruction. Proceedings of the Orthopedic Research Society: San Diego, CA, US
- Capin J, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2017) Gait mechanics differ after ACL reconstruction based on medial meniscal pathology and surgical treatment. Proceedings of the Orthopedic Research Society: San Diego, CA, US
- Capin J, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2017) The effect of post-operative neuromuscular training on gait mechanics in men after ACL reconstruction. Proceedings of the Combined Sections Meeting of the American Physical Therapy Association: San Antonio, TX, US
- Capin J, Zarzycki R, **Khandha A**, Manal K, Buchanan TS, Snyder-Mackler L. (2017) Altered knee loading in patients with bone - patellar tendon - bone ACL reconstruction may mediate osteoarthritis risk. Proceedings of the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine Conference: Shanghai, China
- 2016 Olaode O, **Khandha A**, Buchanan TS. (2016) Establishing a mathematical model to estimate knee joint loading during gait. Research Experience for Undergraduates Symposium: Arlington, VA, US

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- Capin J, **Khandha A**, Zarzycki R, Manal K, Buchanan TS, Snyder-Mackler L. (2016) Lower knee flexor muscle forces during gait are associated with second anterior cruciate ligament injury in young female athletes. American Society of Biomechanics: Raleigh, NC, US
- Lanier A, **Khandha A**, Rooney S, Santare M, Higginson J, Buckley J. (2016) Improving scientific writing capability in an undergraduate population using a fading paradigm scaffolding approach. Proceedings of the American Society for Engineering Education: New Orleans, LA, US
- Khandha A**, Manal K, Wellsandt E, Capin J, Buchanan TS, Snyder-Mackler L. (2016) Peak knee flexion and adduction moments are inversely correlated in subjects with medial compartment osteoarthritis 5 years after anterior cruciate ligament reconstruction. Proceedings of the Osteoarthritis Research Society International: Amsterdam, Netherlands
- Khandha A**, Manal K, Wellsandt E, Snyder-Mackler L, Buchanan TS. (2016) Knee gait mechanics and joint load distribution after anterior cruciate ligament reconstruction (ACLR) for osteoarthritic (OA) vs. non-OA subjects. Proceedings of the Orthopedic Research Society: Orlando, FL, US
- 2015 **Khandha A**, Manal K, Wellsandt E, Buchanan TS, Snyder-Mackler L. (2015) The onset of knee osteoarthritis after anterior cruciate ligament surgery is associated with early unloading followed by an extended period of normal loading. Proceedings of the Osteoarthritis Research Society International: Seattle, WA, US
- Khandha A**, Wellsandt E, Manal K, Marmon A, Snyder-Mackler L, Buchanan TS. (2015) Can medial compartment contact forces in an ACL deficient knee be lower despite higher muscle co-contraction? Proceedings of the Orthopedic Research Society: Las Vegas, NV, US
- 2014 **Khandha A**, Gardinier E, Capin J, Manal K, Snyder-Mackler L, Buchanan TS. (2014) Do decreased medial compartment contact forces and loading asymmetries exist after anterior cruciate ligament reconstruction and rehabilitation? – a 5-year follow-up study. Proceedings of the Osteoarthritis Research Society International: Paris, France
- 2013 Buckley J, Higginson J, Bucha A, **Khandha A**, Elliott D, Buchanan TS. (2013) Research-focused undergraduate laboratory exercises in biomechanics. Proceedings of the American Society of Mechanical Engineers, Bioengineering Division: Summer Bioengineering Conference, Sunriver, OR, US
- 2011 Robie B, Wharton N, Yonemura K, Ferrara L, **Khandha A**, Anand N, Castellvi A. (2011) A clinical assessment of a new technique to assess motion quality. Proceedings of the International Society for the Advancement of Spine Surgery: Las Vegas, NV, US

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Biomedical Engineer/Biomechanics and
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- 2010 Castellvi A, **Khandha A**, Wharton N, Ferrara L, Anand N, Cheng J. (2010) An Analysis of the postop performance of the Stabilimax posterior dynamic stabilization (PDS) implant through measurement of range of motion (ROM) and interpedicular travel (IPT). Proceedings of the Spine Arthroplasty Society: New Orleans, LA, US
- Parikh R, Kiapour A, Goel V, Mhatre D, Castellvi A, **Khandha A**. (2010) Effects of different posterior dynamic systems (PDS) on graded facetectomies. Proceedings of the Spine Arthroplasty Society: New Orleans, LA, US
- Ambati D, Nayak A, Kiapour A, Goel V, **Khandha A**. (2010) A comparison of range of motion (ROM) and forces in a single level vs. multi-level lumbar posterior dynamic stabilization (PDS) implant – finite element (FE) study. Proceedings of the Spine Arthroplasty Society: New Orleans, LA, US
- 2006 Bono C, **Khandha A**, Vadapalli S, Holekamp S, Goel V, Garfin S. (2006) Residual motion after lumbar fusion: Are current radiographic flexion-extension criteria correct? Proceedings of the International Society for the Study of the Lumbar Spine: Bergen, Norway
- 2005 Goel V, Vadapalli S, Sairyo K, Vishnubhotla S, Biyani A, **Khandha A**, Ebraheim N. (2005) Effect of spacer material stiffness on stability, fusion rate and subsidence – a FEM study. Proceedings of the International Society for the Study of the Lumbar Spine: New York, NY, US
- Vadapalli S, **Khandha A**, Goel V, Sairyo K, Biyani A, Ebraheim N. (2005) PEEK spacers promote better bone graft fusion and lesser subsidence across a spinal segment as compared to titanium spacers – a biomechanical rationale. Proceedings of the Orthopedic Research Society: Washington, DC, US
- 2004 Vishnubhotla S, Goel V, Vadapalli S, Masuda A, **Khandha A**, Shaw M, Walkenhorst J, Boyd L. (2004) Dynamic fixation systems compared to rigid spinal instrumentation – a finite element investigation. Proceedings of the American Society of Biomechanics: Portland, OR, US
- Matyas A, Goel V, Vadapalli S, **Khandha A**, Navarro R, Biyani A, Cameron B. (2004) Motion characteristics of a metal-on-polymer disc and a telemeterized natural motion elastomer disc (TNMED) – a finite element study. Proceedings of the International Society for the Study of the Lumbar Spine: Porto, Portugal
- Vadapalli S, **Khandha A**, Goel V, Biyani A, Sairyo K, Malak M. (2004) Stability due to cages placed using antero-lateral and posterior surgical approaches – a biomechanical investigation. Proceedings of the International Society for the Study of the Lumbar Spine: Porto, Portugal

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McGowan D, Goel V, Vadapalli S, **Khandha A**, Garfin S. (2004) Optimized pedicle screw placement for the upper level of lumbar instrumentation. Proceedings of the International Society for the Study of the Lumbar Spine: Porto, Portugal

Bono C, **Khandha A**, Vadapalli S, Holekamp S, Goel V, Garfin S. (2004) Residual motion after lumbar fusion – Are current radiographic flexion-extension criteria correct? Proceedings of the Orthopedic Research Society: San Francisco, CA, US

2003 Vadapalli S, **Khandha A**, Biyani A, Robon M, Goel V, Long R, Malak M. (2003) Stability of a posterior lumbar interbody fusion cage with and without posterior instrumentation. Proceedings of the American Society of Biomechanics: Toledo, OH, US

Khandha A, Vadapalli S, Holekamp S, Goel V, Bono C, Garfin S. (2003) Quantifying sagittal motion across a solid lumbar interbody fusion using finite element modeling. Proceedings of the American Society of Biomechanics: Toledo, OH, US

SERVICE TO PROFESSIONAL ORGANIZATIONS

2017 University of Delaware Mathematical Sciences Seminar Series
Knee biomechanical and biochemical variables early after anterior cruciate ligament reconstruction – mathematical modeling and experimentation.
Newark, DE, US.

2017 International Society of Biomechanics (ISB)
From ACL injury to altered gait to osteoarthritis: biomechanical pathways.
Brisbane, Australia.

2016 University of Toledo Bioengineering Seminar Series
Gait mechanics in those with/without medial compartment osteoarthritis after anterior cruciate ligament reconstruction.
Toledo, OH, US.

HONORS AND AWARDS

2023 Purdue University
Professional Development Experience for Engineering Instructors Award

2020 Orthopaedic Research Society (ORS)
Top 10 % of most downloaded papers in 2018-2019, Journal of Orthopaedic Research (JOR)

2018 National Science Foundation (NSF)
Small Business Innovation Research (SBIR) Innovation Corps (I-Corps) Phase Zero Award

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- 2017 University of Delaware
University of Delaware National Science Foundation (NSF) Innovation Corps (I-Corps)
Sites Award
- 2016 University of Delaware
Biomedical Engineering Best Thesis Award
- 2015 Epicenter, Stanford University
University Innovation Fellow
- 2015 University of Delaware
Professional Development Award for Graduate Students
- 2015 Musculoskeletal Research Laboratories, University of Utah
Image-Based Biomedical Modeling (IBBM) Fellow
- 2015 International Society of Biomechanics (ISB)
Matching Dissertation Grant Award
- 2014 University of Delaware
Biomedical Engineering Graduate Teaching Assistant Fellow
- 2014 University of Delaware
Biomechanics Research Symposium Presentation Award
- 2013 University of Delaware
Biomedical Engineering Graduate Teaching Assistant Award

RESEARCH AND THESIS ADVISING

- 2023 University of Delaware
Honors Thesis Second Reader for Stephen Mondoro, undergraduate student, Biomedical
Engineering
- 2021- University of Delaware
2023 Dissertation Committee Member for Majeed Barakat, graduate student, Biomechanics and
Movement Science
- 2021 Harvard Medical School
Dissertation Committee Member and Content Expert for Ali Kiapour, graduate student,
Clinical Investigation

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Biomedical Engineer/Biomechanics and
Bioengineering/Medical Devices

- 2020- University of Delaware
2021 Honors Thesis Second Reader for Sarah Geissler, undergraduate student, Biomedical Engineering
- 2019- University of Delaware
2020 Honors Thesis Second Reader for Ahlad Neti, undergraduate student, Biomedical Engineering
- 2018- University of Delaware
2019 Dissertation Committee Member for Jacob Capin, graduate student, Biomechanics and Movement Science
- 2018 University of Iowa
Research Mentor for Russell Martin, undergraduate student, Biomedical Engineering
- 2018 Delaware State University
Research Mentor for Logan Faux-Dugan, undergraduate student, Movement Science
- 2018- University of Delaware
2023 Research Mentor for Kelsey Neal, graduate student, Mechanical Engineering
- 2017- University of Delaware
2022 Research Mentor for Jack Williams, graduate student, Mechanical Engineering
- 2016- University of Delaware
2017 Research Mentor for Bryn Bonner, graduate student, Physical Therapy
- 2017 University of Delaware
Research Mentor for Riley Curtin, undergraduate student, Biomedical Engineering
- 2017 University of Virginia
Research Mentor for Daniel Lowe, undergraduate student, Biomedical Engineering
- 2016- Newark Charter High School
2017 Research Mentor for Ivanka Carbajal, high school senior and STEM Capstone Scholar
- 2016 University of Delaware
Research Mentor for Jacob Dexter Fish, undergraduate student, Biomedical Engineering
- 2016 Worcester Polytechnic Institute
Research Mentor for Oluwajomiloju Olaode, undergraduate student, Biomedical Engineering