ADAM J. CYR, Ph.D.
PROFESSIONAL BIOGRAPHICAL OUTLINE

BACKGROUND

Dr. Cyr earned a Bachelor of Science degree in Mechanical Engineering from the University of Portland, Portland, Oregon, and continued on to earn a Doctorate of Philosophy in Biomechanics and Neural Engineering from the University of Kansas, Lawrence, Kansas. Dr. Cyr also held a Post-Doctoral Research Engineering position at the University of Denver, Denver, Colorado. During his dissertation, Dr. Cyr studied the motion and forces of human joints and artificial joint implants under activities of daily living, and evaluated the contributions of ligaments, bone, and cartilage to joint constraint under various conditions. Dr. Cyr also worked on a multi-scale computational model of the human knee to accurately predict joint motion, forces, and ligament contribution for daily activities. During his post-doctoral research, Dr. Cyr helped design and construct an advanced high-speed stereo radiography system to study joint mechanics in live subjects, including foot and ankle, knee, hip, and shoulder motions.

Dr. Cyr has experience with three-dimensional motion capture and analysis, static and dynamic radiographic imaging, statistical-shape and mathematical modeling, kinematic and kinetic analysis, experimental and clinical research involving cadaveric specimens and live human subjects. Dr. Cyr has completed and instructed advanced coursework in biomechanics, as well as materials engineering, clinical orthopedics, and kinesiology. Dr. Cyr has also performed biomechanical analyses as part of clinical care, providing insight into movement patterns for pre- and post-surgical patients, diagnostics, and injury prevention.

Dr. Cyr's academic background, and his experience with experimental research and modeling of the human body, provides a thorough understanding of human physiology, mechanics, biomechanical failure mechanisms, and interaction of the human anatomy with its environment. Currently, he specializes in biomechanics, injury tolerance, biomechanical failure mechanisms, and athlete performance.

SUMMARY OF EXPERIENCE

- Designed and conducted experimental research to quantify the contribution of ligaments, soft-tissue, and bone to human joint constraint

- Performed analyses of kinematic and kinetic variables used to develop next-generation total knee replacement implant design

- Developed novel mathematical and computational models of the human joint to predict changes to joint morphology and ligament contribution under various loading conditions

- Assisted development of a high-speed stereo radiography system integrated with motion control lab, and performed studies to evaluate joint motion with healthy and injured subjects

- Collaborated with a shoe manufacturer to develop a population-based statistical shape model of the foot and ankle to quantify variation in morphology, and inform future development of athletic shoes to accommodate population variation

- Performed clinical gait analyses to aid in surgical planning, rehabilitation, and treatment diagnostics for children with neuromuscular disorders

- Performed analyses to evaluate injury risk for athletes, as well as readiness to play following injury or surgery

AREAS OF EXPERTISE

- Biomechanical Consulting
- Human Injury Tolerance and Failure Mechanisms
- Orthopedic Implant Design
- Knee and Hip Implant Failure
- Accident Reconstruction
- Joint Biomechanics
- Kinematic and Kinetic Analysis
- Experimental and Computational Testing
- Sport Performance

EDUCATION

- Doctor of Philosophy with honors in Biomechanics and Neural Engineering, University of Kansas, 2013
- Bachelor of Science in Mechanical Engineering, University of Portland, 2008

PROFESSIONAL EXPERIENCE

2024 – Present | ARCCA, LLC |Senior Biomechanist

- Practices biomechanics to identify and evaluate injury mechanisms and severity
- Utilizes medical records, testing, computer modeling, and knowledge of human injury tolerance to determine whether an injury is consistent with a specific set of actions or exposure to a specific incident environment
- Investigates and reconstructs motor vehicle collisions, incident sites, and equipment failures

Obviously this is a copy of my prior stint – I'm not sure if you want to modify it

2024 – Present | Epic Biomechanics, LLC |Senior Biomechanist

- Develop protocols for sport-specific skill assessment to measure performance
- Develop protocols for evaluating injury risk of athletes
- Process and analyze biomechanical data to provide insight into movement patterns of athletes
- Collaborate with coaches and teams to assess athletes, and develop strategies for enhancing performance

2019 – 2024 | Mary Bridge Children's Therapy Services | Biomechanist/Bioengineer

- Develop and manage equipment and protocols for the Research and Movement Laboratory.
- Perform evaluations of neuromuscular patients and athletes for clinical diagnostics, sport rehabilitation, and research interests.
- Coordinate with clinical stakeholders to develop treatment plans based on kinematic, kinetic, electromyograph, pedobarograph, and metabolic consumption data

2015 – 2019 | ARCCA, Incorporated |Senior Biomechanist
- Practices biomechanics to identify and evaluate injury mechanisms and severity
- Utilizes medical records, testing, computer modeling, and knowledge of human injury tolerance to determine whether an injury is consistent with a specific set of actions or exposure to a specific incident environment
- Investigates and reconstructs motor vehicle collisions, incident sites, and equipment failures

2013-2015 |University of Denver |Post-Doctoral Research Engineer
- Assisted development of a state-of-the-art high-speed stereo radiography system
- Design and execution of multiple parallel projects involving the knee, foot/ankle, shoulder, and hip
- Experience with data collection from stereo radiography, optical motion capture, force plates, and EMG
- Established protocols and performed data processing from experimental studies
- Developed a statistical shape model of the human foot for quantifying variation among a population of 3D anatomic geometries
- Assisted in development of a natural knee model, including ligament representation, and performed optimization to predict experimental kinematics and kinetics

2008-2013 |University of Kansas |Graduate Research Assistant
- Member of academic portion of research consortium for testing joint implants, funded by DePuy Synthes
- Designed experimental protocols for simulating physiological knee kinematics
- Designed and executed experiments to quantify ligament contribution to knee joint constraint
- Developed multi-dimensional mathematical model of passive joint constraint
- Worked with a dynamic knee simulator to develop physiological protocols to evaluate intact and implanted cadaveric knee joints

2011-2012 |University of Kansas |Instructor
- Primary instructor for senior and graduate level introductory biomechanics course
- Prepared and presented lectures, assignment, and exams
- Responsible final grades

PUBLICATIONS

Pannucci, C.J., Wheeler, C.K., Cyr, K.M., **Cyr, A.J.,** "Breast Implants Decrease Chest Wall Trauma in Low-speed, Unrestrained Motor Vehicle Crash: An Experimental Model", PRS Global Open, 2023.

Shalhoub, S., **Cyr, A.J.,** Maletsky, L.P., "Correlation between Knee Anatomy and Joint Laxity Using Principal Component Analysis", Journal of Orthopaedic Research, 2022.

Pannucci, C.J., **Cyr, A.J.**, Moores, N., Young, J., Szegedi, M., "A ballistics examination of firearm injuries involving breast implants", Journal of Forensic Sciences, 2017.

Kefala, V., **Cyr, A.J.,** Harris, M.D., Hume, D.R., Davidson, B.S., Kim, R.H., Shelburne, K.B., "Assessment of Knee Kinematics in Older Adults Using High-Speed Stereo Radiography", Medicine & Science in Sports & Exercise, 2017.

Smoger, L.M., Shelburne, K.B., **Cyr, A.J.**, Rullkoetter, P.J., Laz, P.J., "Statistical shape modeling predicts patellar bone geometry to enable stereo-radiographic kinematic tracking", Journal of Biomechanics, 2017.

Harris, M.D., **Cyr, A.J.**, Ali, A.A., Fitzpatrick, C.K., Rullkoetter, P.J., Maletsky, L.P., Shelburne, K.B., "A Combined Experimental and Computational Approach to Subject-Specific Analysis of Knee Joint Laxity", J. Biomech Eng, 2016.

Shalhoub, S., Fitzwater, F.G., **Cyr, A.J.**, Maletsky, L.P., "Variations in Medial-Lateral Hamstring Force and Force Ratio Influence Tibiofemoral Kinematics", Journal of Orthopaedic Research, 2016.

Banks, S., Kefala, V., **Cyr, A.**, Shelburne, K., Rullkoetter, P., "The knee centre of rotation is activity dependent in healthy knees", Orthopaedic Proceedings, 2018.

Pannucci, C.J., **Cyr, A.J.**, Moores, N.G., Young, J.B., Szegedi, M., "A Ballistics Examination of Firearm Injuries Involving Breast Implants", Journal of Forensic Sciences, 2017.

Kefala, V., **Cyr, A.J.**, Harris, M.D., Hume, D.R., Davidson, B.S., Kim, R.H., Shelburne, K.B., "Assessment of Knee Kinematics in Older Adults Using High-Speed Stereo Radiography", Medicine and Science in Sports and Exercise, 2017.

Shalhoub, S., Fitzwater, F.G., **Cyr, A.J.**, Maletsky, L.P., "Variations in medial-lateral hamstring force and force ratio influence tibiofemoral kinematics", Journal of Orthopaedic Research, 2016.

Harris, M.D., **Cyr, A.J.**, Ali, A.A., Fitzpatrick, C.K., Rullkoetter, P.J., Maletsky, L.P., Shelburne, K.B., "A Combined Experimental and Computational Approach to Subject-Specific Analysis of Knee Joint Laxity", Journal of Biomechanical Engineering, 2016.

Ali, A.A., Shalhoub, S.S., **Cyr, A.J.**, Fitzpatrick, C.K., Maletsky, L.P., Rullkoetter, P.J., Shelburne, K.B., "Validation of predicted patellofemoral mechanics in a finite element model of the healthy and cruciate-deficient knee", Journal of Biomechanics, 2016.

Cyr A.J., Shalhoub S.S., Fitzwater F.G., Ferris L.A. Maletsky L.P., "Mapping of Contributions from Collateral Ligaments to Overall Knee Joint Constraint: An Experimental Cadaveric Study", Journal of Biomechanical Engineering, 2015.

Ivester J.C., **Cyr A.J.**, Harris M.D., Kulis M.J., Rullkoetter P.J., Shelburne K.B., "A Reconfigurable High-Speed Stereo-Radiography System for Sub-millimeter Measure of In-vivo Joint Kinematics", Journal of Medical Devices, 2015.

Smoger, L.M., **Cyr, A.J.**, Vierczhalek, A., Fitzpatrick, C.K., Clary, C.W., Maletsky, L.P., Rullkoetter, P.J., Laz, P.J., "Statistical Modeling to Characterize Relationships Between Knee Anatomy and Kinematics", Journal of Orthopaedic Research, 2015.

Cyr A.J., Maletsky L.P., "Technical Note: A Multi-Dimensional Description of Knee Laxity using Radial Basis Functions", Computer Methods in Biomechanics and Biomedical Engineering, 2014.

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Cyr A.J., Maletsky L.P., "Unified quantification of variation in passive knee joint constraint", Proceedings of the Institution of Mechanical Engineering, Part H: Journal of Engineering in Medicine, 2014.

Abo-Alhol T.R., Fitzpatrick C.K., Clary C.W., **Cyr A.J.**, Maletsky L.P., Laz P.J., Rullkoetter P.J., "Patellar mechanics during simulated kneeling in the natural and implanted knee", Journal of Biomechanics, 2014.

Fitzpatrick C.K., Clary C.W., **Cyr A.J.**, Maletsky L.P., Rullkoetter P.J., "Mechanics of post-cam engagement during simulated dynamic activity", Journal of Orthopaedic Research, 2013.

Cyr, A.J., Fitzwater, F.G., Maletsky, L.P., "Patellar Kinematics of Three Patellar Geometries in a Simulated Kneeling Activity", Journal of biomechanics, 2012.

CONFERENCE PROCEEDINGS

American Society of Mechanical Engineering Summer Bioengineering Conference
- Poster
  - *"A Cadaveric Study: Is There A Correlation Between Clinical Tests For Anterior-Posterior Laxity and Rotary Instability?"* (June '11)
  - *"Relationship Between Tibial and Femoral Bone Morphology and Soft Tissue Laxity of the Knee Using a PCA Model"* (Primary) (June '11)
  - *"Assessment of In Vitro Patellar Laxity in the Native Knee"* (June '11)

Academy of Pediatric Physical Therapy Conference
- Poster
  - *"Sports Movement Evaluation for the Adolescent Athlete"* (Nov '22)

Annual Frontiers in Medical Devices (ASME/FDA)
- Poster
  - *"Cadaveric Evaluation of Soft-Tissue Constraint in the Human Knee"* (Primary) (Sept '13)

Computer Methods in Biomechanics and Biomedical Engineering
- Podium
  - *"A Unified Envelope Description of Variation in Knee Joint Laxity Using a Principal Component Analysis"* (Primary) (Apr '13)

European Society of Biomechanics
- Podium
  - *"Patellar Kinematics of Three Patellar Geometries in a Simulated Kneeling Activity"* (Primary) (July '12)
  - *"Change in Total Knee Stiffness as a Function of Flexion Angle"* (Primary) (July '10)

Medicine & Science in Sports & Exercise
- Poster
  - *"Assessment of Normal Knee Kinematics During Activities of Daily Living in Older Adults"* (May '15)
  - *"Comparison of Marker-based and Stereo Radiography Knee Kinematics in Assessment of Activities of Daily Living"* (May '15)

Mountain West Society of Plastic Surgeons
- Poster
  - *"A Ballistics Examination of Firearm Injuries Involving Breast Implants"* (March '17)

Orthopedic Research Society
- Poster
  - *"Contribution from Collateral Ligaments to Overall Knee Joint Constraint"* (Primary) (Mar '15)
  - *"Can the Entire Boundary of Knee Laxity be Determined by a Few Specific Laxity Measures?"* (Mar '15)
  - *"Statistical Modeling to Characterize Relationships Between Knee Anatomy and Kinematics"* (Mar '14)
  - *"Changes in Mid-Flexion Knee Laxity after Total Knee Replacement"* (Jan '10)

Pediatric Research in Sports Medicine
- Podium
  - *"The Role of Foot Contact Angle During a Deceleration Task"* (Primary) (Jan '24)

World Congress of Biomechanics
- Poster
  - *"Implant Tracking Using a High-Speed Stereo Radiography System"* (Primary) (July '14)