André M. Loyd

PhD

Senior Managing Consultant, Director of Biomechanics

Dr. Loyd is a Senior Managing Consultant for ESI. He is an experienced biomechanical and injury reconstruction specialist. He has more than 22 years of experience in the field of biomechanics. He provides injury reconstruction analysis for pedestrian injuries, slip and fall incidents, industrial accidents, vehicle accidents and criminal cases. Dr. Loyd has particular expertise in pediatric injury, head injury and neck injury.

Before joining ESi, André earned a doctorate from the Injury Biomechanics Laboratory at Duke University and completed a post-doctorate fellowship through the Orthopedic Biomechanics Laboratory at the Mayo Clinic. He conducted research on pediatric and adult head injury, neck laceration, helmets, neck injury, bone fracture and crash dummy accuracy. He also published in such journals as the Stapp Car Crash Journal, Journal of Biomechanics, Accident Analysis and Prevention, Forensic Science International and Traffic Injury Prevention.

Education

PhD, Biomedical Engineering, Duke University, Durham, NC. 2012

MS, Biomedical Engineering, Duke University, Durham, NC. 2006

BS, Mechanical Engineering, Clemson University, Clemson, SC. 2002

Positions Held

Engineering Systems, Inc., Plymouth, Minnesota

- Senior Managing Consultant, 2025 – Present
- Senior Staff Consultant, 2019 – 2025

Crane Engineering, Plymouth, Minnesota

- Biomechanical and Accident Reconstruction Specialist, 2014 – 2018

Contact Information

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ESi Minnesota

2355 Polaris Lane North
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Areas of Specialization

- Accident Analysis and Prevention
- Biomechanics
- Child abuse
- Head Injury
- Human Capability
- Human Injury Analysis
- Mechanics
- Neck Injury
- Pediatric Injury
- Slips and Falls

S-E-A Limited, Houston, Texas

- Biomechanical and Accident Reconstruction Specialist, 2013 – 2014

Mayo Clinic, Rochester, Minnesota

- Biomechanics and Motion Analysis Laboratory Post-Doctoral Fellow, 2012 – 2013

Duke University, Durham, North Carolina

- Biomedical Engineering Graduate Student Biomechanics Focus, 2003 – 2011

Continuing Education

- **Traffic Crash Reconstruction for the Forensic Engineer,** Northwest University Center for Public Safety, 2019

Professional Affiliations/Honors

Caffey Award (Child Abuse Research Award)

- Honorable Mention for Best Basic Science Paper at 2012 Ped. Radiology Conference

NIH Ruth L. Kirschstein National Research Service Fellow, 2012

2nd Place Stapp Student Award for Paper at Stapp Car Crash Conference, 2010

National Science Fellow (NSF)

- Member – 2002-2005

Outstanding Senior and Junior in Mechanical Engineering,

- Member – 2001-2002

Relevant Classes

Clemson University

- Biomechanics Bio E 320
- Introduction to Biomedical Engineer: Organs and Tissues Bio E 201
- Special Topics in Biomechanical Engineering BIO E 450
- Engineering Mechanics: Dynamics ENGR 120
- Engineering Mechanics: Statics EM 201
- Physics with Calculus I & II PHYS 122/221
- Fundamentals in Machine Design ME 306
- Mechanical Engineering Design ME 401

- Manufacturing Process and Applications ME 404
- Material for Mechanical Engineering Applications
- Mechanics of Materials EM 304

Duke University

- Tissue Biomechanics BME 230
- Biomechanical Graduate Advanced Topics Seminars

Publications

"The Response of the Pediatric Head to Impacts onto a Rigid Surface," **A.M. Loyd**, R. W. Nightingale, J. F. Luck, C. D. Bass, H. C. Cutcliffe and B. S. Myers. Journal of Biomechanics 93: pp. 167-176, August 27, 2019.

“Interpreting Oblique Impact Data from an Accelerometer-Instrumented Ice Hockey Helmet,” Jorgensen, J.K., Thoreson, A.R., Stuart, M.B., **A.M. Loyd**, Smith, A.M., Twardowski, C., Gaz, D.V., Hollman, J.H., Krause, D.A., Nan An, K. and Stuart, M.J., Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology, 231(4), pp.307-316, 2017.

“Bringing Things Full Cycle – How to Approach Bicycle Crash Investigations from Every Perspective Amid Rising Use,” **A.M. Loyd**, H. Mercado-Corujo, L. Flores, CLM Magazine, January 2017.

“The Compressive Stiffness of Human Pediatric Heads,” **A.M. Loyd**, Nightingale, Roger W., Luck, Jason F., Song, Yin, Fronheiser, Lucy, Cutcliffe, Hattie, Myers, Barry S., Bass, Cameron R. ‘Dale’, Journal of Biomechanics, 48(14): 3766-3775 2015.

“Pediatric Coronal Suture Fiber Alignment and the Effect of Interdigitation on Coronal Suture Mechanical Properties,” Adamski, Kelly N., **A.M. Loyd**, Samost, Al, Myers, Barry, Nightingale, Roger, Smith, Kathleen, Bass, Cameron ‘Dale’, Annals of Biomedical Engineering, 2015.

“The Response of the Adult and ATD Heads to Impacts onto a Rigid Surface,” **A.M. Loyd**, Nightingale, Roger W., Song, Yin, Luck, Jason F., Cutcliffe, Hattie, Myers, Barry S., Bass, Cameron ‘Dale’, Accident Analysis & Prevention, 2014.

“The Effects of Time and Moisture on Elasticity Imaging Phantom Physical Properties: A Pilot Study,” **A.M. Loyd**, Amador, Carolina, An, Kai-Nan, Revista Ingenieria Biomedica, 2014.

“The Most Cut-Resistant Neck Guard for Preventing Lacerations to the Neck,” **A.M. Loyd**, Berglund, Larry, Twardowski, Casey P., Stuart, Michael B., Smith, Ansley, Gaz, Daniel V., Krause, David A., An, Kai-Nan, Stuart, Michael J., Clinical Journal of Sports Medicine, 2014.

“Three-Dimensional Adult Male Head and Skull Contours,” Lee, Calvin, **A.M. Loyd**, Nightingale, Roger, Myers, Barry S., Damon, Andrew, Bass, Cameron R. ‘Dale’, Traffic Injury Prevention, 2014.

“Tensile Failure Properties of the Perinatal, Neonatal and Pediatric Cadaveric Cervical Spine,” Luck, Jason, Nightingale, Roger, Song, Yin, Kait, Jason R., **A.M. Loyd**, Myers, Barry S., Bass, Cameron, Spine, 2013.

"Impact Properties of Adult and ATD Heads," **A.M. Loyd**, Nightingale, Roger W., Song, Yin, Luck, Jason F., Cutcliffe, Hattie, Myers, Barry S., Bass, Cameron R.'Dale', In: International Research Council on Biomechanics of Injury, 2012.

"Evaluation of Pediatric Skull Fracture Imaging Techniques Mulroy," Maura H., **A.M. Loyd**, Frush, Donald P., Verla, Terence G., Bass, Cameron R. 'Dale,' Myers, Barry S., Forensic Science International, 2012.

"The Mechanical and Morphological Properties of 6-Year-Old Cranial Bone," Davis, Matthew, **A.M. Loyd**, Shen, Han-yu Henry, Mulroy, Maura H., Nightingale, Roger W., Myers, Barry S., Bass, Cameron 'Dale', Journal of Biomechanics, 2012.

"Skull Biomechanics. In: Orthopaedic Biomechanics," **A.M. Loyd**, Van-Ee, Chris, Panzer, Matthew, Bass, Cameron R., Myers, Barry: Edited by Winkelstein, Beth A.: CRC Press, 2012 – Book Chapter.

"Pediatric Head Contours and Inertial Properties for ATD Design," **A.M. Loyd**, Nightingale, Roger, Bass, Cameron R., Mertz, Harold J., Frush, Donald, Daniel, Clark, Lee, Calvin, Marcus, Jeffrey R., Mukundan, Srinivasan, Myers, Barry S., Stapp Car Crash Conference, 2010.

"Expansion and Evaluation of Data Characterizing the Structural Behavior of the Pediatric Abdomen," Lamp, John F., Salzar, Robert, Kerrigan, Jason, Parent, Daniel, Lopez-Valdez, Fracisco, Lau, Sabrina, Lessley, David, Kent, Richard, Luck, Jason, **A.M. Loyd**, 54th Annual Conference of the Association for the Advancement of Automotive Medicine, 2010.

"Use of a Three-Dimensional Normative Database of Pediatric Craniofacial Morphology for Modern Anthropometric Analysis," Marcus, Jeffrey R., Domeshek, Leahthan F., **A.M. Loyd**, Schoenleber, John M., Das, Rajesh R., Nightingale, Roger W., Mukundan, Srinivasan, Plastic and Reconstructive Surgery, 2009.

"Pediatric Thoracoabdominal Biomechanics," Kent, Richard, Salzar, Robert, Kerrigan, Jason, Parent, Daniel, Lessley, David, Sochor, Mark, Luck, Jason F., **A.M. Loyd**, Song, Yin, Nightingale, Roger, Bass, Cameron R. 'Dale', Maltese, Matthew R., Stapp Car Crash Journal, 2009.

"Tensile Mechanical Properties of the Perinatal and Pediatric PMHS Osteoligamentous Cervical Spine," Luck, Jason F., Nightingale, Roger W., **A.M. Loyd**, Prange, Michael T., Dibb, Alan T., Song, Yin, Fronheiser, Lucy, Myers, Barry S., Stapp Car Crash Journal, 2008.

Presentations

"Biomechanical Considerations for Homicides Involving Vehicles" **A.M. Loyd**, presented at Minnesota Public Defender's Crash Reconstruction Seminar, Alexandria, MN, 2025.

"Evaluation of Child Abuse Cases: Perspectives from a Biomechanic and a Pathologist" **A.M. Loyd**, presented at SPD's 2022 Annual Criminal Defense Conference, Milwaukee, WI, 2022.

"The Value of Biomechanics to your Criminal Case" **A.M. Loyd**, presented at SPD's 2022 Annual Criminal Defense Conference, Milwaukee, WI, 2022.

"Biomechanics and Its Use in Criminal Cases," **A.M. Loyd**, webinar presented at the 13th Annual NACDL Forensic Science & the Law Webinar, 2021.

"Seatback Litigation – Trending Claims & Testing Update (Bio)," **A.M. Loyd**, presented at DRI Product Liability Conference, Nashville, TN 2021.

"The Use and Non-Use of Safety Equipment," **A.M. Loyd**, webinar presented for Engineering Systems, Inc. (ESi) Webinar, 2021.

"Minor Vehicle Collision and Injury Analysis," **A.M. Loyd**, presented at Twin Cities Claim Association Meeting, Bloomington, MN, 2015.

"Accident Reconstruction and Biomechanics," **A.M. Loyd**, presented at Houston Claims Association Meeting S-E-A, Ltd., Houston, TX, 2014.

"Height Threshold for Pediatric Skull Fracture: Cadaver Study", **A.M. Loyd**, presented at the Society for Pediatric Radiology 55th Annual Meeting & Postgraduate Course, San Francisco, CA, 2012.

"Pediatric Head Contours and Inertia Properties for ATD Design," **A.M. Loyd**, presented at 54th Stapp Car Crash Conference, Scottsdale, AZ, 2010.

"Expansion and Evaluation of Data Characterizing the Structural Behavior of the Pediatric Abdomen," **A.M. Loyd**, presented at Association for the Advancement of Automotive Medicine, Las Vegas, NV, 2010.

"Pediatric Head Impact Response," **A.M. Loyd**, presented at the 6th World Congress on Biomechanics, Singapore.

"Determination of Tensile Stiffness Scale Factors for Pediatric Cervical Spines," **A.M. Loyd**, presented at the 6th World Congress on Biomechanics, Singapore.

"Pediatric Thoracoabdominal Biomechanics," **A.M. Loyd**, presented at 53rd Stapp Car Crash Conference Savannah, GA, 2009.

"Impact Headprints of Dummies, Pediatric and Adult Post-Mortem Human Surrogates," **A.M. Loyd**, presented at Injury Biomechanics Research, 37th International Workshop, Savannah, GA, 2009.

"Strain Softening in Adult and Pediatric Dura Mater," **A.M. Loyd**, presented at Injury Biomechanics Research: 37th International Workshop, Savannah, GA.

"Thresholding Techniques for Developing Geometrically Accurate Pediatric Skull and Cervical Spine Models," **A.M. Loyd**, presented at Injury Biomechanics Research: 32nd International Workshop, Nashville, TN.

"Pediatric Head Contour Data: a pilot study," **A.M. Loyd**, presented at Injury Biomechanics Research: 34th International Workshop, Dearborn, MI.

"Pediatric Head Contour Data: a pilot study," **A.M. Loyd**, presented at National Society of Black Engineers National Convention Columbus, OH, 2007.

"Biomechanics of the Pediatric Head," **A.M. Loyd**, presented at Bouchet Society Meeting Durham, NC, 2007.

"Pediatric Head Contour Data: a pilot study," **A.M. Loyd**, presented at Injury Biomechanics Research: 34th International Workshop, Dearborn, MI, 2006.

"Tensile Mechanical Properties of the Pediatric Human Osteoligamentous Cervical Spine," **A.M. Loyd**, presented at 5th World Congress of Biomechanics, Munich, Germany, 2006.

"A CT Method for Finding the Pediatric Head Center of Gravity and Inertial Properties," **A.M. Loyd**, presented at National Society of Black Engineers National Convention, Pittsburgh, PA, 2006.

"Thresholding Techniques for Developing Geometrically Accurate Pediatric Skull and Cervical Spine Models," **A.M. Loyd**, presented at National Society of Black Engineers Tech Talks, Boston, MA, 2005.

"Mechanical Properties of the Human Pediatric Head and Cervical Spine," **A.M. Loyd**, presented at Southern Consortium for Injury Biomechanics: 3rd Annual Meeting, Birmingham, AL, 2005.

"A CT Method for Finding the Pediatric Head Center of Gravity and Inertial Properties," **A.M. Loyd**, presented at Injury Biomechanics Research: 33rd International Workshop, Washington, District of Columbia, 2005.

"Thresholding Techniques for Developing Geometrically Accurate Pediatric Skull and Cervical Spine Models," **A.M. Loyd**, presented at Injury Biomechanics Research: 32nd International Workshop, Nashville, TN, 2004.