DESIGN RESEARCH ENGINEERING

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Chris A. Van Ee

Areas of Professional Specializations

- Impact Biomechanics: Human Injury Mechanisms and Tolerance
- Accident Reconstruction, Human Movement
  - Vehicle and Marine Accidents
  - Industrial Accidents
  - Amusement and Water Park Rides and Adventure Attractions
- Forensic Investigations: Falls, Assaults, 3D Scene Reconstruction and Visualization
- Computational Modeling, Experimental Design, Laboratory Investigations, Data Analysis
- Orthopedic Biomechanics
- Mechanical Engineering
- Occupational Machine Safety and Product Design
- Safety Device Performance: Helmets, Guards, Seat Belts, Airbags, Child Restraints

Education

Ph.D. (Biomedical Engineering), Duke University, 2000
Advisor: Barry S. Myers M.D. Ph.D.
B.S. (Mechanical Engineering), Dordt College, 1992

Licensure

Professional Engineer: State of Michigan #6201056733 (Exp: 9/16/2027)

Professional Background

Principal Engineer: Biomedical and Mechanical Engineering
Design Research Engineering, Novi, Michigan
2009 - Present

Adjunct Assistant Professor
Department of Biomedical Engineering, Wayne State University, Detroit, Michigan
2002 - Present

Senior Biomechanical Engineer
Design Research Engineering, Novi, Michigan
2005 - 2009

Project Engineer
Design Research Engineering, Novi, Michigan
2002 - 2005

Assistant Research Scientist
University of Michigan Transportation Research Institute, Ann Arbor, Michigan
2000 - 2002

Doctoral Candidate
Department of Biomedical Engineering, Duke University, Durham, North Carolina
1998-2000

Research Assistant
Department of Biomedical Engineering, Duke University, Durham, North Carolina
1992-1998

Custom Design Engineer
Pella Corporation, Pella, Iowa
1991 - 1992

Engineering Technician
Vermeer Manufacturing, Pella, Iowa
1990

Professional Affiliations, Service, Certifications

Association for the Advancement of Automotive Medicine
- Membership Committee (2012-2020)
- Scientific Program Committee (2006-2011)
- Chairman of the Scientific Program Committee (2009-2010)

Society of Automotive Engineers Occupant Protection Committee (2005-Present)
- Chairman of the Automobile Body Activity of the Land and Sea Group (2010-2013)
- Vice-Chairman of the Automobile Body Activity of the Land and Sea Group (2009-2010)
- Chairman of the Occupant Protection Committee (2008-2009)
- Vice-Chairman of Occupant Protection Committee (2006-2008)

Member: Society of Automotive Engineers Automated Driving Systems (ADS) Crashworthiness Task Force Committee (2017)

Co-organizer of the Occupant Restraints Session: SAE World Congress (2006-2025)

Co-chairperson of the Biomechanics Session: SAE World Congress 2006

Session Organizer: Dynamics and Control of Biomechanical Systems III, 2009 ASME International Mechanical Engineering Congress & Exposition

Traffic Accident Reconstruction, Northwestern University Center for Public Safety (June 2008, Dearborn, MI)

Child Passenger Safety Technician - The National Standardized Child Passenger Safety Training Program (June 2006 - June 2010)

Associate Editor: Journal of Forensic Biomechanics (2010-2013)

Associate Editor: SAE International Journal of Transportation Safety (2013- 2025)

Associate Editor: SAE International Journal of Passenger Cars—Mechanical Systems (2010-2021)

Associate Editor: SAE International Journal of Passenger Vehicle Systems (2022-2025)

Editor: SAE Occupant Protection and Crashworthiness Technology Collection (2009-2012)

Review Panel Member: American Institute of Biological Sciences review of United States Army Aeromedical Research Laboratory (February 2008)

Reviewer for American Institute of Biological Sciences: review of proposal submitted to US Army Medical Research and Materiel Command

Reviewer and Review Panel Member, National Institutes of Health (2003-2008, 2012-2015)
- Special Emphasis Panel/Scientific Review Group ZRG1 MOSS, Musculoskeletal, Oral and Skin Sciences
- Study Section ZRG1 BDCN-K Clinical Neurophysiology, Devices and Neuroprosthetics / Brain Disorders and Clinical Neuroscience
- Study Section ZRG1-GRM, Geriatrics and Rehabilitation Medicine
- Study Section MRS, Musculoskeletal Rehabilitation Sciences
- Study Section ZRG1-SBDD, Rehabilitative Medicine

Reviewer, SAE Congress:
- Biomechanics
- Occupant Restraints
- Side Impact, Rear Impact and Rollover

Reviewer: Safety

Reviewer: International Journal of Crashworthiness

Reviewer: Annals of Biomedical Engineering

Reviewer: Accident Analysis and Prevention

Reviewer: Traffic Injury Prevention
Reviewer: ASME: Occupant Protection & Biomechanics
Reviewer: Journal of Biomechanics
Reviewer: Journal of Biomechanical Engineering
Reviewer: Medical Engineering & Physics
Reviewer: SAE International Journal of Passenger Cars
Reviewer: SAE International Journal of Transportation Safety
Reviewer: Journal of Forensic and Legal Medicine
Reviewer: International Journal of Industrial Ergonomics
Reviewer: Neurotrauma Reports
Invited Reviewer: Stapp Car Crash Journal 2009
Judge, ASME PhD Student Paper Competition (Summer 2007)
Member, American Society of Biomechanics (ASB)
Member, American Society of Mechanical Engineers (ASME)
Member, Society of Automotive Engineering Society (SAE)
Member, Association for the Advancement of Automotive Medicine (AAAM)

Honors and Awards

John Paul Stapp Award
Best paper at the 2008 Stapp Car Crash Conference
UMTRI Best Publication Award
University of Michigan Transportation Research Institute best publication award for 2004
UMTRI Best Publication Award
University of Michigan Transportation Research Institute best publication award for 2003
John Paul Stapp Award
Best paper at the 2000 Stapp Car Crash Conference
Stapp Association Student Award
Most outstanding student presentation at the 2000 Stapp Car Crash conference.
Ralph H. Isbrandt Automotive Safety Award
Best paper presented to the Society of Automotive Engineers on the subject of Automotive Safety Engineering for the year 1995.
Arnold W. Siegel Award
Society of Automotive Engineers' award for the most outstanding paper presented at the 1995 Stapp Car Crash Conference.
Duke University Research Fellowship
National Science Foundation Fellowship Committee Honorable Mention
Dordt College Merit Scholarship

Publications

"The Hybrid III Upper and Lower Neck Response in Compressive Loading Scenarios with Known Human Injury Outcomes," Traffic Inj Prev. 2014;15 Suppl 1:S223-30. (with D. Toomey, K. Yang)
"ATV Rollover, Rider Response, and Determinants of Injury: In-Depth Analysis of Video-Documented ATV Rollover Events" Traffic Inj Prev. 2014;15 Suppl 1:S190-6. (with D. Toomey, B. Moroski-Browne, M. Vander Roest, A. Wilson)
"Towards a More Robust Lower Neck Compressive Injury Tolerance - An Approach Combining Multiple Test Methodologies," Traffic Injury Prevention, 2013;14(8):845-52, (with D. Toomey, K. Yang, N. Yoganandan, F. Pintar)

"Biomechanical Evaluation of Frangible Skull Surrogates to Blunt Ballistic Temporo-parietal Head Impact" (Abstract) American Academy of Forensic Sciences 65th Annual Meeting, February 18-23, 2013 (with D. Raymond, G. Crawford, and C. Bir).

"Skull Biomechanics" Orthopaedic Biomechanics, ed. B.A. Winkelstein, Boca Raton: CRC Press Taylor and Francis Group, 2013. (with C.R. Bass, A.M. Lloyd, B.S. Myers, M.B. Panzer).

"Exploring the Role of Lateral Bending Postures and Asymmetric Loading on Cervical Spine Compression Responses", 2009 ASME International Mechanical Engineering Congress & Exposition, IMECE2009-12911, (with D Toomey, M Mason, W Hardy, K Yang, J Kopacz).

"Evaluation and Refinement of the CRABI-6 Anthropomorphic Test Device Injury Criteria for Skull Fracture", Proceedings 2009 ASME International Mechanical Engineering Congress & Exposition, IMECE2009-12973, (with B Moroski-Browne, D Raymond, K Thibault, W Hardy, J Plunkett).

"Child ATD Reconstruction of a Fatal Pediatric Fall", 2009 ASME International Mechanical Engineering Congress & Exposition, IMECE2009-12994, (with D Raymond, K Thibault, W Hardy, J Plunkett).

"Development of Biomechanical Response Corridors of the Head to Blunt Ballistic Temporo-Parietal Impact," Journal of Biomechanical Engineering, September 2009, Vol. 131 (with DE Raymond, GS Crawford, CA Bir).

"Tolerance of the Skull to Blunt Ballistic Temporo-parietal Impact", Journal of Biomechanics, Nov 13;42(15):2479-85, 2009 (with DE Raymond, GS Crawford, CA Bir).

"Mechanisms of Traumatic Rupture of the Aorta and Associated Peri-isthmic Motion and Deformation" Stapp Car Crash Journal, Vol. 52, November 2008. (with W. Hardy, CS Shaw, MJ Mason, JM Kopacz, KH Yang, AI King, JL Bishop, RF Banglmaier, MJ Bey, RM Morgan, KH Digges).

"Use of Computational Models in Marine Accident Reconstruction", 2008 TASS Americas MADYMO Users Meeting, April, Detroit, MI (with Robert Taylor).

"The Effect of Soft Tissue On The Biomechanics Of Skull Fracture Due To Blunt Ballistic Impact: Preliminary Analysis and Findings" (Abstract) 2008 Summer Bioengineering Conference, June 25-29, 2008 (with D. Raymond, G. Crawford, C. Bir).

"Biomechanics of Temporo-Parietal Skull Fracture from Blunt Ballistic Impact" (Abstract) 2008 Summer Bioengineering Conference, June 25-29, 2008 (with D. Raymond, G. Crawford, C. Bir).

"Biomechanics of Blunt Ballistic Impacts to the Head and Fracture-Specific Injury Criteria Development" (Abstract) American Academy of Forensic Sciences 60th Annual Meeting, February 18-23, 2008 (with D. Raymond, G. Crawford, and C. Bir).

"Biomechanics of Blunt Ballistic Impacts to the Forehead and Zygoma" (Abstract-Poster) American Academy of Forensic Sciences 60th Annual Meeting, February 18-23, 2008 (with G. Crawford, D. Raymond, and C. Bir).

"Head Exposure Levels in Pediatric Falls" (abstract-poster) National Neurotrauma Society Meeting, 2007 (with K. Monson, C. Sparrey, L. Cheng, and G. Manley).

"Dynamic Biaxial Tissue Properties of the Human Cadaver Aorta," Stapp Car Crash Journal, Vol. 50, November 2006 (with C.S. Shah, W.N. Hardy, M.J. Mason, and K.H. Yang, R. Morgan, and K. Digges).

"Study of Potential Mechanisms of Traumatic Rupture of the Aorta Using In Situ Experiments," Stapp Car Crash Journal, Vol. 50, November 2006 (W.N. Hardy, C.S. Shah, J.M. Kopacz, K.H. Yang, R. Morgan and K. Digges).

"Investigation of Potential Mechanisms of Traumatic Rupture of the Aorta" (Abstract #5245) Proceedings of the World Congress of Biomechanics – Munich, Germany August 2006 (with W.N. Hardy, C.S. Shah, M.J. Mason, K.H.Yang, and K. Digges).

"Safety Restraint System Physical Evidence and Biomechanical Injury Potential Due to Belt Entanglement," SAE Paper 2006-01-1670, 2006 SAE World Congress (with D.E. Toomey and M.E. Klima).

"High-Speed Biaxial Tissue Properties of the Human Cadaver Aorta," Proceedings of IMECE05 - 2005 ASME International Mechanical Engineering Congress, November 2005. (with C.S. Shah, M.J. Mason, K.H. Yang, W.N. Hardy, R. Morgan, and K. Digges).

"A New Device for High-Speed Biaxial Tissue Testing: Application to Traumatic Rupture of the Aorta," SAE Paper 2005-01-0741, SAE 2005 Transactions: Journal of Passenger Cars. (with M.J. Mason, C.S. Shah, M. Maddali, K.H. Yang, W. N. Hardy, and K. Digges).

"Use of Computer Models in Forensic Investigations of Human Kinematics: Examples from Alpine Skiing and Marine Accident Reconstruction", Proceedings of AmeriPAM 2004 (Abstract) (with E. Morphy and R. Taylor).

"Mechanical Properties and Anthropometry of the Human Infant Head," Stapp Car Crash Journal, 2004 (with M.T. Prange, J. F. Luck, A. Dibb, R. W. Nightingale, and B. S. Myers).

"Cervical-spine Geometry in the Automotive Seated Posture: Variations with Age, Stature, and Gender," Stapp Car Crash Journal, 2004 (with K. D. Klinich, S. Ebert, C. Flannagan, M. Prasad, M. P. Reed, and L. W. Schneider).

"Improved Estimation of Human Neck Tensile Tolerance: Reducing the Range of Reported Tolerance Using Anthropometrically Correct Muscles and Optimized Physiologic Initial Conditions." Stapp Car Crash Jounal, November 2003, (with V. C. Chancey, R. W. Nightingale, K. E. Knaub, and B. S. Myers).

"The Tolerance of the Human Hip to Dynamic Knee Loading." Stapp Car Crash Jounal, pp 211-228, November, 2002. (with J. D. Rupp, M. P. Reed, S. Kuppa, S. C. Wang, J. A. Goulet, and L. W. Schneider).

"Techniques and Applications in Strain Measurements in Skeletal Muscle." **Biomechanic Systems, Techniques, and Applications. Volume III**. Leondes CT, ED., CRC Press, Boca Raton, Florida 2001 (with B. S. Myers).

"Lateral Bending Strength of the Cervical Spine Estimated from Muscle Generated Moments," 2001 BMES Annual Fall Meeting Proceedings (Abstract) (with V. C. Chancey, R. W. Nightingale, K. E. Knaub, and B. S. Myers).

"Tensile Properties of the Human Muscular and Ligamentous Cervical Spine." 2000 Stapp Car Crash Journal, pp 85-102, November, 2000 (with R. W. Nightingale, D. L. A. Camacho, V. C. Chancey, K. E. Knaub, E. A. Sun, and B. S. Myers).

"Tensile Properties of the Human Muscular and Ligamentous Cervical Spine." Ph.D. Thesis, Duke Universty, 2000.

"Quantifying Skeletal Muscle Properties in Cadaveric Test Specimens: Effects of Mechanical Loading, Postmortem Time, and Freezer Storage." Journal of Biomechanical Engineering, 122:9-14, February 2000 (with A. L. Chasse, and B. S. Myers).

"Understanding and Minimizing Error in Cervical Spine Tensile Testing," Proceedings: The 28th International Workshop on Human Subjects for Biomechanical Research, 2000 (with V. C. Chancey, R. W. Nightingale, D. L. A. Camacho, B. S. Myers).

"Tensile Testing of the Ligamentous Cervical Spine: Biomechanical Considerations for a Proposed Testing Methodology." Proceedings: The 27th International Workshop on Human Subjects for Biomechanical Research, 1999 (with R. W. Nightingale, and B. S. Myers).

"Muscle Fixation Methods to Increase Cadaveric Biofidelity: Results of a Single Fiber Muscle Model," The 9th Injury Prevention Through Biomechanics Symposium Proceedings, Detroit, MI, 1999 (with M. R. Larochelle, W. Feng, M. K. Reedy, F. H. Schachat, and B. S. Myers).

"The Effects of Postmortem Time and Freezer Storage on the Mechanical Properties of Skeletal Muscle." The 8th Injury Prevention Through Biomechanics Symposium Proceedings, Detroit, MI, 1998 (with A.L Chasse, B. S. Myers).

"Injury Mechanisms in the Pediatric Cervical Spine During Out-of-Position Airbag Deployments." Proceedings of the 42nd Association of the Advancement of Automotive Medicine, 1998 (with R. W. Nightingale, B. A. Winkelstein, and B. S. Myers).

"The Effects of Postmortem Time and Freezer Storage on the Mechanical Properties of Skeletal Muscle." Society of Automotive Engineers, J. Passenger Cars, SAE Paper #983155, 1998 (with A. L. Chasse, and B. S. Myers).

"Measurement of Human Neck Muscle Volume Geometry and Physiologic Cross-Sectional Area in 5th, 50th and 95th Percentile Subjects using Cadaveric Dissection and MRI." 25th Annual International Workshop for Human Subjects for Biomechanical Research, 1997 (with K. E. Knaub, C. Cheng, B. Poon, C. Spritzer, and B. S. Myers).

"On the Structural and Material Properties of Mammalian Skeletal Muscle and its Relevance to Human Cervical Impact Dynamics." Society of Automotive Engineers, J. Passenger Cars, SAE Paper #952723, 1995 (with B. S. Myers, D. L. A. Camacho, C. T. Woolley, and T. M. Best).

"Measurement of the Structural and Material Properties of Mammalian Skeletal Muscle." The 5th Injury Prevention Through Biomechanics Symposium Proceedings, Detroit, MI, 1995 (with D. L. A. Camacho, C. T. Woolley, T. M. Best, and B. S. Myers).

Presentations

"Identifying Mechanisms of Injury: Impact Biomechanics," New Hampshire Association of Criminal Defense Lawyers CLE, Manchester, NH, May 9, 2025.

"Biomechanics and Accident Reconstruction in Criminal Cases," Annual President's Seminar and Conference, Wisconsin Association of Criminal Defense Lawyers, April 19, 2024.

"Case Studies in Forensic Biomechanics," Invited Speaker, Wayne State Biomedical Engineering Department Seminar April 17, 2024

"Biomechanical Primer on Pediatric Head Injuries," Invited Speaker, Wisconsin State Public Defender's Office: Forensic University - Falls and Forensic Medicine, March 20, 2024.

Invited Lecturer, "Biomechanical Engineering," JLC-444 Topics in Criminal Justice: Anatomy of a Homicide, Department of Justice, Law & Criminology, American University, Dec 9, 2021

"Biomechanical Engineering," Invited Speaker, Industrial and Operations Engineering Course 438: Occupational Safety Management, University of Michigan. January 2021.

"Forensic Biomechanical Analysis," Invited Lecturer, Wayne State University, Biomedical Engineering 8070, January 22, 2020.

"The Biomechanics of Pediatric Head Injury," Invited Speaker, New Jersey Forensic Science Center Technology Center, Hamilton, NJ, New Jersey Office of the Public Defender CLE Program. August 2018.

"The Physics of Falls," TCDLA, Invited Speaker, Fort Worth, TX, September 2017

"The Biomechanics of Pediatric Head Injury," The Center for American and International Law, Plano, TX, March 2016.

"Biomechanics of Pediatric Head Injury," NYSDA Annual Conference, Saratoga, NY, July 2015.

"ATV Rollover, Rider Response, and Determinants of Injury: In-Depth Analysis of Video-Documented ATV Rollover Events," 57th Annual Scientific Conference, Association for the Advancement of Automotive Medicine (AAAM), Munich, Germany, October 2014.

"Biomechanical Evaluation of Traumatic Brain Injury," World Congress on Infant Head Trauma, The Center for American and International Law, Plano, TX, November 2013.

"Biomechanics of Pediatric Head Injury," Invited Lecturer, Center for Forensic Science and Medicine, University of Toronto, March 22, 2013.

"ATV Rollover, Operator Response, and Determinants of Injury: Implications for Crush Protection Devices," US Consumer Product Safety Commission: ATV Safety Summit, Bethesda, MD, October 12, 2012.

"Evaluation and Refinement of the CRABI-6 Anthropomorphic Test Device Injury Criteria for Skull Fracture," 2009 ASME International Mechanical Engineering Congress & Exposition, November 18, 2009.

"Child ATD Reconstruction of a Fatal Pediatric Fall," 2009 ASME International Mechanical Engineering Congress & Exposition, November 18, 2009.

"Use of Computational Models in Marine Accident Reconstruction," 2008 TASS Americas MADYMO Users Meeting, April, Detroit, MI

"Pediatric Head Injury Risk: Automotive Accidents, Falls, Household Trauma, and Non-Accidental Injury," The Center for American and International Law, March 2008.

"Pediatric Head Injury: Injury Mechanisms and Injury Tolerance", Invited Lecturer for BME 7810 – Forensic Bioengineering, Wayne State University, November 2007.

"Principles of the Biomechanical Analysis of Infant Brain Injury" and "Case Studies in Infant Brain Injury Analysis," co-presenter with Kirk Thibault at the EBMS Symposium – An Evidence-Based Analysis of Infant Brain and Skeletal Injury, May 2007.

"Characterizing Pediatric Head Injury Risk: Automotive Accidents, Falls, and Shaking," Invited Keynote Speaker: 15th Annual Meeting of the Rachidian Society, Kona, HI, February 2007.

"Tensile Tolerance of the Cervical Spine" Invited Keynote Speaker: 15th Annual Meeting of the Rachidian Society, Kona, HI, February 2007.

"Safety Restraint System Physical Evidence and Biomechanical Injury Potential Due to Belt Entanglement," co-presenter with M. Klima, SAE World Congress, Detroit, MI, April 2006.

"Biomechanics, Falls, and Shaken Baby Syndrome," Guest Lecturer for BME 7995 – Forensic Bioengineering, Wayne State University, October 2005.

"Trial Techniques and Strategies: Making the Most of Your Experts," co-presenter with Jeffrey Weiner, Florida Bar Continuing Legal Education Seminar, Miami, FL, January 21, 2005.

"Use of Computer Models in Forensic Investigations of Human Kinematics: Examples from Alpine Skiing and Marine Accident Reconstruction", AmeriPAM Nov 3, 2004.

"Marine Accident Reconstruction: Forensic Engineering and Biomechanics" Wayne State University, June 7, 2004.

"Biomechanics and Physical Restraint, An Analysis of the Mandt System." Dallas, TX, April 22, 2004.

"Rollovers, Neck Injury, and Defining the Role of Lateral Bending in Compressive Neck Injury." Wayne State University, March 15, 2004.

"Development of an Experimental Protocol to Quantify the Tolerance of the Hip to Axial Femur Loading." The 29th International Workshop on Human Subjects for Biomechanical Research. San Antonio, TX, November 2001.

"Head and Cervical Spine Geometry in the Automotive Neutral, Flexion, and Extension Postures." Ford Motor Company, Dearborn, MI, September 2001.

"Tensile Properties of the Human Muscular and Ligamentous Cervical Spine." 2000 Stapp Car Crash Conference, Atlanta, GA, November 2000.

"Development of an Experimental Model of Tensile Neck Injury." The 27th International Workshop on Human Subjects for Biomechanical Research, San Diego, CA, October 1999.

"A Combined Experimental and Computational Study of Tensile Neck Injury." National Highway Traffic Safety Administration, Durham, NC, July 1999.

"Neck Surrogates: A Systematic Experimental and Computational Study Designed to Provide Anthropometric Test Device Injury Reference Values." National Highway Traffic Safety Administration, Washington, DC, December 1998.

"The Effects of Postmortem Time and Freezer Storage on the Mechanical Properties of Skeletal Muscle." The 42nd Annual Stapp Car Crash Conference, Phoenix, AZ, November 2-4, 1998.

"The Effects of Postmortem Time and Freezer Storage on the Mechanical Properties of Skeletal Muscle." The 8th Injury Prevention Through Biomechanics Symposium, Detroit, MI, May 7-8, 1998.

"Measurement of the Structural and Material Properties of Mammalian Skeletal Muscle." The 5th Injury Prevention Through Biomechanics Symposium, Detroit, MI, May 4-5, 1995.

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