



ANDREW J. RENTSCHLER, Ph.D.

PROFESSIONAL BIOGRAPHICAL OUTLINE

BACKGROUND

Dr. Rentschler received a Bachelors of Science in Mechanical Engineering with a minor in Biomedical Engineering from Carnegie Mellon University. He then went on to obtain a Masters of Science and a Ph.D. in Bioengineering from the University of Pittsburgh. While at the University of Pittsburgh, Dr. Rentschler's research included investigating the biomechanics of gait and falls in order to mitigate related injuries through the design of an autonomous robotic walker, as well as three dimensional motion and force analyses to study the biomechanics of shoulder, wrist, and spine injuries in wheelchair users. He has overseen clinical studies of live human subjects and participated in testing with anthropomorphic test devices (ATD) to gauge injury potential. Dr. Rentschler has completed advanced coursework in the fields of biomechanics, kinematics of the human body, biomaterials, engineering mechanics, and anatomy and physiology.

Dr. Rentschler's academic and professional experience represents an extensive combination of mechanical and biomechanical engineering, including human kinematic analysis, ATD testing, and human anatomy and physiology. Currently, he specializes in the study of the kinematics and kinetics of the human body, injury mechanisms, and associated tolerances.

AREAS OF SPECIALTY

- Injury Causation Biomechanics
- Human Injury Tolerance
- Gait and Fall Analysis
- Vehicular Accident Reconstruction
- Human Kinematic Analysis and Testing
- Injury Mechanism Analysis

ACADEMIC BACKGROUND

- Doctor of Philosophy in Bioengineering, University of Pittsburgh, 2004
- Masters of Science in Bioengineering, University of Pittsburgh, 2002
- Bachelors of Science in Mechanical Engineering with a minor in Biomedical Engineering, Carnegie Mellon University, 1995

PROFESSIONAL EXPERIENCE

ARCCA, Incorporated | Director of Biomechanics & Human Factors – Midwest, V.P., Senior Biomechanist

- Conducted scientific analysis of the performance of National Hockey League (NHL) hockey arenas and board structures to develop and implement a new design to mitigate and prevent player trauma and injuries.
- Evaluated the design and performance of NHL player protective equipment including shoulder pads, skate guards, and helmets.
- Conducted dynamic vehicle and underbody blast testing to evaluate and design a new seating and restraint system for the military.
- Currently perform research and analysis to evaluate and study the relationships between crash injuries and crash forces, occupant kinematics, and human tolerances by utilizing human subjects and anthropomorphic test devices.
- Specialize in crash injury analysis, injury mechanism determination, and crash kinematics

- Evaluate forensic evidence associated with impact and inertial loading conditions produced during events such as motor vehicle collisions, slips, trips, and falls, and work place and leisure incidents.
- Participates in biomechanical investigations that explore human kinematics and tolerance to potentially injurious environments
- Researches injury mechanisms and contributes to the design of vehicles, products, and environments to mitigate injurious events in sports, automotive, and work settings.

CED/Accident Analysis Inc. | Forensic Engineer

- Responsible for performing investigative and analytical consulting services in order to determine the cause and circumstances of accidents with respect to injury tolerance and mechanisms.
- Consulted on biomechanics, slip and fall accidents, and vehicle accident reconstruction.

B.E.A.R. | Forensic Engineer

- Conducted analyses for the evaluation of injury biomechanics pertaining to vehicular, industrial, sports, and slip and fall accidents, as well as vehicle accident reconstruction.

Human Engineering Research Laboratories, School of Health and Rehabilitation Services, University of Pittsburgh, VA Pittsburgh Health Care System | Research Associate

- Conducted graduate research to develop and test an autonomous robotic walker to help prevent injuries from falls and increase user independence.
- Performed human subject testing and analysis to study the biomechanics and injury mechanisms of wheelchair users.
- Developed and utilized safety testing for assistive technology devices being reviewed by the FDA.
- Conducted clinical studies to investigate human kinematics and vibration absorption in manual and electric powered wheelchair users

PROFESSIONAL AFFILIATIONS

- Society of Automotive Engineers
- American Society of Mechanical Engineers
- Reviewer for Archives of Physical Medicine and Rehabilitation and BioMedical Engineering OnLine

PROFESSIONAL EDUCATION

- Biomechanics of High-Impact Injuries, NTSB
- Methodology and Techniques of Crash Data Retrieval, IPTM
- Human Factors in Traffic Crash Reconstruction, IPTM
- Automobile Safety and Injury Biomechanics, VT Center for Injury Biomechanics
- Injuries, Anatomy, Biomechanics and Federal Regulations, SAE
- Vehicle Accident Reconstruction Methods, SAE
- Linear Momentum Analysis, CAARS
- Motor Vehicle Accident Reconstruction, SAE
- Advanced Collision Investigation, California Law Enforcement
- Post Collision Passenger Vehicle Inspection and Seat Belt Analysis, CAARS

PUBLICATIONS

Peer-Reviewed Journal Publications

Rentschler, AJ, Cooper RA, Fitzgerald SG, Boninger ML, et. al. (2003). *Evaluation of Selected Electric Powered Wheelchairs Using the ANSI/RESNA Standards*. Archives of Physical Medicine and Rehabilitation.

Rentschler, AJ, Cooper RA, Blasch B, et. al. (2003). *Intelligent Walkers for the Elderly: Performance and Safety Testing of the VA-PAMAID Robotic Walker*. Journal of Rehabilitation Research and Development.

Fitzgerald SG, Cooper RA, Boninger ML, **Rentschler, AJ**, et. al. (2001). *Comparison of Fatigue Life for Three Types of Manual Wheelchairs*. Archives of Physical Medicine and Rehabilitation. 82:10. 1484-1488.

Cooper RA, Fitzgerald SG, Boninger ML, Prins K, **Rentschler, AJ**, et. al. (2001). *Evaluation of a Pushrim Activated Power Assisted Wheelchair*. Archives of Physical Medicine and Rehabilitation. 82:5. 702-708.

Cooper RA, **Rentschler, AJ**, O'Connor TJ, Ster JF, et. al. (2000). *Technical Note: Displacement between the Seating Surface and Hybrid Test Dummy during Transitions with a Variable Configuration Wheelchair*. Journal of Rehabilitation Research and Development. 37:3. 297-303.

DiGiovine MM, Cooper RA, Boninger ML, Lawrence BL, VanSickle DP, **Rentschler, A.J.** (2000). *User Assessment of Manual Wheelchair Ride Comfort and Ergonomics*, Archives of Physical Medicine and Rehabilitation. 81:4. 490-494.

Cooper RA, DiGiovine CP, **Rentschler, AJ**, et. al. (1999). *Fatigue Life of Two Manual Wheelchair Cross-Brace Designs*. Archives of Physical Medicine and Rehabilitation. 80:9. 1078-1081.

Cooper RA, Boninger ML, **Rentschler, A.** (1999). *Evaluation of Selected Ultralight Manual Wheelchairs Using ANSI/RESNA Standards*. Archives of Physical Medicine and Rehabilitation. 80:4. 462-467.

Cooper RA, O'Connor TJ, Gonzalez JP, Boninger ML, and **Rentschler, AJ.** (1999). *Augmentation of the 100 kg ISO Wheelchair Test Dummy to Accommodate Higher Mass*. Journal of Rehabilitation Research and Development. 36:1. 48-54. See www.vard.org

Book Chapters

Rentschler, AJ. (2007). Walker Systems in *The Engineering Handbook on Smart Technology for Aging, Disability and Independence*. Ed. A. Helal, M. Mokhtari and B. Abdulrazak. Wiley & Sons.

Peer-Reviewed Proceedings Publications (i.e. expanded abstracts)

Rentschler, AJ, Blasch B, Boninger ML. (2003). *Evaluation of the VA-PAMAID Robotic Walker*. 26th Annual RESNA Conference, Atlanta, GA.

Rentschler, AJ, Cooper RA, Boninger, ML, et. al. (2001). *Using Stability and Fatigue Strength Testing When Choosing a Manual Wheelchair*. Proceedings 24th Annual RESNA Conference, Reno, NV. 335-337.

Algood D, Cooper RA, **Rentschler, AJ**, et. al. (2001). *Power and Control System Testing of Five Different Types of Power Wheelchairs*. Proceedings 24th Annual RESNA Conference, Reno, NV. 421-423.

Vitek JM, Cooper RA, **Rentschler, AJ**, et. al. (2001). *Static, Impact, and Fatigue Testing of Five Different Types of Electric Powered Wheelchairs. Proceedings 24th Annual RESNA Conference, Reno, NV.* 343-345.

Rentschler, AJ, Cooper RA, Wolf EJ, Boninger ML. (2000). *Climatic Testing of Five Different Types of Power Wheelchairs. Proceedings 23rd Annual RESNA Conference, Orlando, FL.* 441-443.

Wolf E, Cooper RA, **Rentschler, AJ**, et. al. (2000). *Comparison of Energy Consumption and Maximum Speed in Electric Powered Wheelchairs. Proceedings 23rd Annual RESNA Conference, Orlando, FL.* 453-455.

Fitzgerald SG, Cooper RA, **Rentschler, AJ**, et. al. (1999). *Comparison of Fatigue Life for Three Types of Manual Wheelchairs. Proceedings 21st Annual IEEE/EMBS International Conference, Atlanta, GA.* CD-ROM.

Rentschler, AJ, Cooper RA. (1999). *A Comparison of the Dynamic and Static Stability of Power Wheelchairs versus Scooters. Proceedings 21st Annual IEEE/EMBS International Conference, Atlanta, GA.* CD-ROM.

Dvorznak MJ, Cooper RA, **Rentschler AJ**, et. al. (1999). *Displacement between Seating Surface and Test Dummy during Transition with a Variable Configuration Wheelchair. Proceedings 21st Annual IEEE/EMBS International Conference, Atlanta, GA.* CD-ROM.

Rentschler AJ, Cooper RA, Boninger ML, et. al. (1999). *A Comparison of Power Wheelchair Stability using ANSI/RESNA standards. Proceedings 22nd Annual RESNA Conference, Long Beach, CA.* 284-286.

Liu D, Cooper RA, Tai C, **Rentschler A**, et. al. (1998). *Effect of a Cushion on Whole Body Accelerations during Wheelchair Propulsion. Proceedings 21st Annual RESNA Conference, Minneapolis, MN.* 137-139.

Liu D, Cooper RA, Tai C, **Rentschler A**, et. al. (1998). *Quantitative Assessment of the Vibration Experience by Wheelchair Users during Activities of Daily Living. Proceedings 21st Annual RESNA Conference, Minneapolis, MN.* 134-136.

Gonzalez J, Cooper RA, **Rentschler A**, et. al. (1997). *Frame Failures of Welded Tube Manual Wheelchairs. Proceedings 20th Annual RESNA Conference, Pittsburgh, PA.* 184-186.

Peer-Reviewed Abstracts

Wolf EJ, Cooper RA, **Rentschler AJ**, et. al. (2000). *Comparison of Energy Consumption in Electric Powered Wheelchairs. Proceedings 2nd Nat. Dept. of Veterans Affairs Rehab R&D Conference, Arlington, VA.* 223.

Rentschler AJ, Cooper RA, Fitzgerald SF, et. al. (2000). *Fatigue Life Analysis of Manual Wheelchairs. Proceedings 2nd National Department of Veterans Affairs Rehab R&D Conference, Arlington, VA.* 214.

DiGiovine CP, Cooper RA, DiGiovine MM, **Rentschler AJ**, et. al. (1998). *Comparison of Two Types of Cross Brace Designs Used on Rehabilitation Wheelchairs. VA Rehabilitation Research and Development Conference, Washington, D.C.*

Cooper RA, VanSickle DP, Boninger ML, Gonzalez JP, Lawrence BL, **Rentschler A**, et. al. (1997). *Design and Selection Guidelines for Wheelchair Rider Comfort. Rehabilitation Research and Development Progress Reports.* 290-291.