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JAMES K. SPRAGUE, Ph.D., P.E.

PRINCIPAL

DIRECTOR OF AUTOMOTIVE BIOMECHANICS & DESIGN

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Dr. Sprague specializes in dynamics and kinematics of rigid body systems, including modeling, numerical simulation and analysis, vehicle dynamics and tire mechanics, statistical data analysis, accident reconstruction, testing and analysis of vehicles, automotive systems and components, ergonomics of vehicle interiors and entryways, dynamics of gears and power trains, and safety requirements for machine tools. He also handles instrumentation, design of experiments and analysis of data, biomechanics of human movement, locomotion, mobility, and balance, and gerontological biomechanics and sports biomechanics.

Dr. Sprague is active in many technical and professional societies and has published many articles in referred journals and conference proceedings.

Areas of Specialization

Automotive and Industrial Accident Reconstruction
Conspicuity, Night - Time Visibility
Failure Analysis of Tires and Tire Mechanics
Limit Behavior of Road Vehicles
Failure Analysis of Mechanical Components
Biomechanics of Human Movement

Education

Ph.D., Mechanical Engineering, University of Michigan, Ann Arbor, MI, 1994

M.S., Mechanical Engineering, University of Akron, Akron, OH, 1989

B.S., Mechanical Engineering, University of Illinois at Urbana, Champaign, IL, 1984

Licensed Professional Engineer (P.E.)

State of Michigan	License No. 6201041636
State of Ohio	License No. 68998
State of Illinois	License No. 062-057700

January 2024



Professional Affiliations/Honors

American Society of Mechanical Engineers (ASME)

Member

Society of Automotive Engineers (SAE)

Member

National Society of Professional Engineers (NSPE)

Member

Positions Held

Engineering Systems Inc., Ann Arbor, MI

Director of Automotive Biomechanics and Design, 2017 - Present

Principal, 2010 - Present

Manager of Michigan Operations, 2010 - 2017

Packer Engineering, Inc., Ann Arbor, MI

Senior Vice President, 2008 - 2010

Vice President, 2003 - 2008

Exponent, Failure Analysis Associates, Farmington Hills, MI

Managing Engineer, 1995 - 2002

University of Michigan Transportation Research Institute, Ann Arbor, MI

Post - Doctoral Researcher, 1994 - 1995

University of Michigan College of Engineering, Ann Arbor, MI

Research Assistant (Biomechanics), 1991 - 1994

Teaching Assistant, Lecturer - ME240 (Dynamics), 1989 - 1991

Mechanical Dynamics, Inc., Ann Arbor, MI

Consultant and Sponsored Researcher, 1989 - 1991

The Goodyear Tire and Rubber Corporation, Akron, OH

Vehicle Dynamics Modeling and Analysis, 1987 - 1989

Racing Tire Design and Development, 1984 - 1987



Continued Education

Event Data Recorder Update and Analysis

Ruth Consulting, Atlanta, GA, 2023

National Society of Professional Engineers

Continuing Education Seminars, NSPE, 2023

Accident Reconstruction, The Autonomous Vehicle and ADAS

Certificate of Achievement, SAE International, 2022

Applying Automotive EDR Data to Traffic Crash Reconstruction

Certificate of Achievement, SAE International, 2021

Traffic Signal Timing Records Interpretation and Analysis

Traffic Signal Academy, University of Tennessee, 2020

HVE Forum

Certificate of Completion, Engineering Dynamics Corporation, Austin, TX, 2020

Applied Vehicle Dynamics Course

Autobahn Country Club, Joliet, IL, 2018

Human Factors in Traffic Crash Reconstruction

Institute of Police Technology Management, University of North Florida, Fort Myers, FL, 2017

Traffic Crash Reconstruction I

Northwestern University Center for Public Safety, Ann Arbor, MI, 2015

Vehicular Crash Reconstruction Methods Seminar

Certificate of Achievement, SAE International, Troy, MI, 2014

Crash Data Retrieval (CDR) Technician Level 1

Collision Safety Institute, Ft. Myers, 2014

Leading High-Performing Teams

University of Michigan, 2013



Metallurgy for the Non-Metallurgist

ASM International, 2006

Industrial Fork Truck Operator Safety Training

2006

Mine Safety and Health Administration Hazard Certification for Coal and Underground

2006

HVE Simulator

Engineering Dynamics Corporation, 2005

OSHA 10-Hour General Industry Safety Standards

2004

Crash Data Retrieval

Michigan State University Highway Traffic Safety Program, 2003

Mechanics of Heavy-Duty Trucks and Truck Combinations

University of Michigan, 1998

Photogrammetry in Accident Reconstruction

SAE, 1998

Traffic Accident Reconstruction I

The Traffic Institute, Northwestern University, 1996

Bertil Roos Racing School Competitive Driving Class

Akron, OH, 1988

ADAMS (Automatic Dynamic Analysis of Mechanical Systems) Training

MDI Ann Arbor, MI 1986

Tire Mechanics

University of Akron, 1985

Vehicle Dynamics

Milliken Research Associates, Buffalo, NY, 1985

Publications/Presentations

"Final Report: Phase IV Compliance Testing for Locomotive LED Headlights and Auxiliary Lights," M. Meza-Arroyo, **J.K. Sprague**, P.A. Shibata, S. Woods. U.S. Department of Transportation, Federal Railroad Administration, Washington, DC. July 2020.

"Comparative Lumbar Spine Acceleration Data During Daily and Dynamic Activities, Tasks of Daily Driving, and Low Speed Lateral Vehicle Impacts," P.A. Shibata, A.E. Mathias, A.E. Light, M. Meza-Arroyo, **J.K. Sprague**, A.L. Stern. Biomedical Sciences Instrumentation, 56th Annual Rocky Mountain Bioengineering Symposium, Milwaukee, WI. Biomedical Sciences Instrumentation Journal, Volume 55(2). pp. 159-166, April 2019.

"Head Acceleration Measurements During Vehicle Driving Tasks and Lateral Impacts Relative to Head Accelerations During Daily and Dynamic Activities," P.A. Shibata, A.E. Mathias, A. Light, M. Meza-Arroyo, **J.K. Sprague**, A.L. Stern. Biomedical Sciences Instrumentation, 56th Annual Rocky Mountain Bioengineering Symposium, Milwaukee, WI. Biomedical Sciences Instrumentation Journal, Volume 55(2). pp. 120-127, April 2019.

"Enhancing Contrast - Sensitivity Charts for Validating Visual Representations of Low Illumination Scenes," **J.K. Sprague**, M. Meza-Arroyo, P.A. Shibata, J.A. Auflick "SAE Technical Paper 2019-01-1009, 2019.

"The Kinematic Analysis of Occupant Excursions and Accelerations During Staged Low Speed Far-Side Lateral Vehicle-to-Vehicle Impacts," P.A. Shibata, J.M. Roberts, **J.K. Sprague**, A.E. Light, J.A. Stegemann, M. Meza-Arroyo, S.P. Capser, SAE Technical paper 2019-01-1030, 2019.

"Human Factors Techniques in the Analysis of Low Illumination Accidents: Integrating Conspicuity, Validated Photography, and Scientific Animation," J.L. Auflick, **J.K. Sprague**, P.A. Shibata, and, D. Kruger, Proceedings of the Human Factors and Ergonomics Society 59th Annual Meeting, Los Angeles, CA, October 26 - 29, 2015.

"Journal of Failure Analysis and Prevention," **J.K. Sprague**, Reviewer 2014 - 2020

"Overload Fracture of Cast Aluminum Wheel," Journal of Failure Analysis and Prevention, E.R. Weishaupt, M.E. Stevenson, **J.K. Sprague**, Volume 14, Issue 6, December 2014.

"A Link Between Occupant and Vehicle Accelerations During Common Driving Tasks," Biomed Sci Instrum, A.C. Mathias, P.A. Shibata, and **J.K. Sprague** presented at the 51st Annual Rocky Mountain Bioengineering Symposium, Denver, CO, 50:197-204 (2014)

"Analysis of Nighttime Vehicular Collisions and the Application of Human Factors: An Integrated Approach," **J.K. Sprague**, P.A. Shibata, and J.L. Auflick, SAE Technical Paper 2014-01-0442 SAE International, 2014.

"Human Factors: Answering the How and Why Questions," **J.K. Sprague** and J.L. Auflick, In House Continuing Education Technical Presentation for State Farm Attorneys, Withrow & Associates, Toronto, ON, Canada, September 5, 2012.

"Automotive Failure Analysis: How they Crash, How they Break," Continuing Education Technical Presentation for attorneys and insurance professionals, ESI - Ann Arbor, Michigan Open House Event, **Co-lecturer** with Gary R. Rogers, P.E., May 17, 2012.

"Accident Reconstruction & Injury Analysis," **Guest Lecturer**, Chartis Insurance Company, Atlanta, GA, April 12, 2012.

"Risk Assessment Methods," **Presenter**, Annual Product Safety & Liability Conference, Milwaukee, WI, 2009.

Risk Management Forum, **Presenter**, Midwest Truckers Association, Collinsville, IN, 2008.

CIV ENG 395-0 Engineering Forensics, **Invited Guest Lecturer** at Northwestern University, Robert R. McCormick School of Engineering and Applied Science, Chicago, IL, 2006.

"Determining Angular Head Accelerations Using an External Array of Linear Accelerometers: A Preliminary Analysis of Everyday Activities," L.A. Wojcik, P.A. Shibata, and **J.K. Sprague**, Proceedings of the 2005 Summer Bioengineering Conference, J.S. Wayne, F. Guilak, G.A. Livesay, and J.W. Holmes, eds., The American Society of Mechanical Engineers, #b0055211, Vail, CO, 2005.

"Automated Stability Analysis of a Vehicle in Combined Pitch and Roll," Advanced Vehicle Simulation and Virtual Proving Ground, International Mechanical Engineering Congress and Exposition. Paper IMECE2002-33184, 2002.

"Proper Model Generation: An Energy-Based Methodology", L.S. Louca, J.L. Stein, G.M. Hulbert, and **J.K. Sprague**, Proceedings of the 1997 International Conference on Bond Graph Modeling and Simulation, Phoenix, AZ, 1997.

"The Use of Stepping to Maintain Upright Balance: Biomechanical Analyses in Young and Old Adults," **J.K. Sprague**, Ph.D. Thesis, University of Michigan, Ann Arbor, MI, 1994.

"Biomechanics of Stepping Balance," Seminar, The Cleveland Clinic, Cleveland, OH, 1994.

"The Safety and Mobility of Older Drivers: What We Know and Promising Research Issues," The University of Michigan Transportation Research Institute Final Report to American Automobile Manufacturers Association, Ann Arbor, MI, 1994.

"Do Young and Old Adults Differ in Their Use of Steps to Recover Upright Balance," Presentation, The Gerontological Society of America Program Committee Annual Meeting, 1994.

ADAMS/A Tire User's Manual Version 6.0.0. - Analytical Tire Modeling Software for use with ADAMS, 1990.

"A Biomechanical Analysis of the Use of Stepping to Maintain Balance," Presentation, American Society of Mechanical Engineers Summer Bioengineering Conference, 1993.



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January 2024

“Dynamic Tooth Loading in a Compliant Gear Mesh with Rim Effects,” **J.K. Sprague**, Master’s Thesis,
University of Akron, Akron, OH, 1989.

Patents

United States Patent:

Patent No: 9,188,498

Patent Title: Tire Pressure Measuring Device